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# MAXIMUM PC

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## IN THE LAB











MORE +



Gordon Mah Ung

# TAKE BACK THE MESSAGING

**AS A CLOSE** observer of politics and messaging, I've noticed that the politician who controls the terminology, controls the message. Thus inheritance tax becomes a "death tax" and a $1 trillion tax increase turns into "revenue enhancement."

The PC has long been a victim of this. Years ago, when the "do everything on the server" crowd tried to fight back against the rising adoption rate of PCs in companies, they pointed to the higher cost of PCs, and started calling their products "thin clients" and PCs the "fat clients." No matter what your physical stature is, we can all admit that labeling something "fat" conjures up the image of some slovenly dude wearing a T-shirt stained by Taco Bell Fire Sauce. Rather than fight back with its own messaging by calling thin clients "weak clients," the PC industry shrugged its shoulders and sheepishly accepted the label.

More recently, the industry, analysts, and media have embraced the phrase "post PC" as a way to describe the end of the PC. Rather than you sitting in an office all day under greenish fluorescent lighting processing TPS reports from a desktop, you'll be using your post-PC device while reclining in the grass under the warm sun of the Hobbit Shire. Because that's how we'll all work in the post-PC world. Hell, why go to the office at all? Why not just tell your boss you're working from a café today on your tablet? I'm sure she'll give you the thumbs up.

I'm not going to let them control the messaging anymore. The "fat client"? That's actually a "*fast* client" or "*productive* client" now. Oh, you say you can't even view 4K video, let alone edit it, on your thin client or tablet? Perhaps you might want to use a productive client for it.

And just as the Mayan's predicted: On January 4, 2014 (1.4.14), a gravity wave will obliterate all of the major PC vendors and hardware suppliers, leading to a post-PC apocalyptic world. With no fast PCs left in the world, editing of 4K video or converting 12GB of RAW image files from a 36MP DSLR camera can only be done on a post-PC apocalyptic device, such as your dual-core tablet. Also, those really long essays? They'll have to be done by touch or on an exceedingly cramped and unreliable Bluetooth keyboard.

I don't know about you, but I'm not looking forward to living in a post-PC apocalyptic world.



*Gordon Mah Ung is Maximum PC's deputy editor, senior hardware expert, and all-around muckraker.*

submit your questions to: comments@maximumpc.com

# THE NEWS

# Intel Throws in Towel on Motherboards

## Says it's still fully committed to desktop PCs

**IN WHAT WILL ONLY** be interpreted as more evidence of the dawn of the "Post-PC era," Intel announced that it will quit the consumer motherboard business after 20 years and end all production and development of mainboards, after its next CPU is introduced.

The company said it would wind down operations of its Intel Channel Board Division (ICBD) over the next three years, with the final new designs released around the company's upcoming "Haswell" CPU.

"As Intel gradually ramps down its motherboard business, we are ramping up critical areas of the desktop space, including integration of innovative solutions for the PC ecosystem, such as reference design development, NUC, and other areas to be discussed later," said Intel spokesman Daniel Snyder.

Snyder emphasized that the move is no sign Intel believes for a second that desktops are doomed.

"The Desktop segment continues to be a major focus for Intel, with hundreds of products across many sub-segments and applications. Intel expects the broad and capable [desktop] motherboard ecosystem (i.e., Asus, Gigabyte, MSI, and many others) to fully support Intel's growing roadmap and large worldwide customer base," Snyder said. "Intel remains very committed to the desktop business. We are making significant investments in the enthusiast platform with our K SKU portfolio and new 3rd Gen Intel Core Extreme Processors. In fact, Intel's roadmap includes 227 desktop SKUs at 34 different price points, offering desktop solutions for a wide range of customers. In addition, Intel is also significantly investing in the growing All-in-One ecosystem, contributing to 30 percent growth over the last few years."



Intel's "Skulltrail" enthusiast chipset turned our heads and sparked imitators, but it wasn't enough to keep the division alive.

Snyder declined to say why Intel chose to shutter the ICBD, but one can guess it wasn't a huge money maker for the multibillion-dollar company. While bad from a PR standpoint, the decision to exit from consumer boards isn't likely to be felt too far and wide, either. Asus and Gigabyte dominate the consumer motherboard sector, producing a combined 70 percent of all boards sold. ASRock and MSI are next, and Intel barely moves the needle.

Intel's boards were rarely on the bleeding edge or in the hunt for bling-appeal. The ICBD tried changing that tune in 2008, though. That year, the division turned heads with its Skulltrail motherboard, boasting two Xeons rebranded as "Core 2 Extreme QX9770." The board even promised to support SLI, but this became a political football between Nvidia and Intel over the former's license to make chipsets for the then-new Core i7 CPUs. Intel's boards, frankly, never shook their reputation for being "Intel-reliable" but eminently forgettable.

The eventual shuttering of Intel's retail board division won't impact its internal board division, known as the Customer Reference Board Group. The CRBG is tasked with developing test motherboards for the company's new CPUs. It even issues design guidelines and tips to third-party motherboard vendors. CRB boards are usually supplied to OEMs and board makers to conduct very early testing. In fact, the ICBD has long joked that it's usually last in line to get CRB boards and design criteria. Paying customers like Asus and Gigabyte get higher priority.

No matter what Intel says, the move is likely to reignite rumors and perpetual conspiracy theories that it plans to ditch desktop computing entirely. Just a month ago, Intel was said to be abandoning all sockets for future desktops once Haswell is released, in favor of BGA (ball grid array) products that would come soldered onto motherboards. Such a move, many pointed out, would indeed signal a sea change for the DIY crowd, who like the granularity of picking and choosing their processors separately from motherboards. **–Gordon Mah Ung**

# Nvidia Announces GeForce GTX Titan

This month, Nvidia pulled the wraps off what will likely become the Fastest Single GPU in the World—the mouth-watering GeForce GTX Titan. Based on its Big Kepler GK110 chip, the Titan is a nod to the Titan SuperComputer at Oak Ridge National Laboratory, which employs 18,688 Tesla K20 GPUs, also based on the GK110 chip. The Titan GPU will sit right between the single-GPU GTX 680 and the dual-GPU GTX 690 on the performance and price scales, but it'll be much closer to the GTX 690, thanks to its rumored $900 price tag and specs that are almost double those of a GTX 680 although not quite on par with the GTX 690. For example, the Titan has 2,688 CUDA cores to the GTX 690's 3,072 (the GTX 680 has 1,536)—on the other hand, its clock speed is 837MHz compared to the 690's 915MHz, while the GTX 680's is 1,006MHz. For full specs, benchmarks, and more info check www.maximumpc.com. **–JN**




## Logitech Shakes Things Up

Logitech announced that it will discontinue "non-strategic products," including speaker docks, console-gaming peripherals, and the popular Harmony One universal remote, after having a rough financial quarter. Sales were $615 million, down 14 percent from one year prior. Throw in an operating loss of $180 million, in part based on a non-cash goodwill impairment charge estimated to be $211 million, but also the result of lower demand.

It's a surprising decision, considering Logitech pointed to "continued weakness in the global PC market" as the "primary factor in our disappointing Q3 results."

Logitech president and CEO Bracken P. Darrell said, "We intend to sustain our leadership in PC platform–related products where we have engineering, distribution, and scale advantages. Our goal with PC-platform products is to maximize profitability, while investing selectively in growing categories." **–PL**

# Maximum PC Launches Official Windows 8 App

Windows 8 people, we know you can't get enough of our awesome stories. So we are pleased to announce the official launch of the Windows 8 Maximum PC Online app!

The app is created, designed, and optimized for Windows 8. It will allow you to view all of MaximumPC.com's cutting-edge news stories, reviews, features, and how-to's from any Windows 8 device. What are we charging for this? Nothing. It's absolutely free! Folks, we do it because we think *you're* Kick Ass.

To download the app, open up the Windows 8 store, type in "Maximum PC Online," and install. **–JT**






Tom Halfhill
**Fast Forward**

# INTEL'S POWER GAMES

**WHAT'S A WATT?** Depends how you measure it. Electrical engineers agree that watts equals volts times amps, but they start disagreeing when measuring the power dissipation of a microprocessor. Power consumption varies with the software workload, which can be anything from a program's idle loop to a high-frame-rate videogame.

Intel recently provoked controversy while announcing a third-generation Core processor (an Ivy Bridge variant) for ultrathin notebooks and tablets. The company said its new Y-series Core processor will use 7 watts of "scenario design power" (SDP). Nobody had ever heard of SDP, so the general reaction was "WTF?"

Usually, Intel specifies "thermal design power" (TDP). That rating is the maximum power dissipation that engineers should consider when designing the cooling system. TDP isn't quite as high as "maximum" power (a worst-case rating), but it's higher than "typical" power (another common but poorly defined specification). So SDP is Intel's new definition of typical power.

But what's the scenario? Without specifying the software workload under which the SDP was measured, Intel was telling us nothing. With a light workload, the new processor could sip less than 1 watt. When heavily loaded, it could gulp more than 10 watts. Although the scenario remains vague, the company is admitting some outsiders to its labs to observe power measurements.

Conclusion: The scenario varies. Intel engineers are running many different tasks while carefully monitoring power dissipation and temperatures. The heaviest workloads are graphics-intensive action games, which slow to virtually unplayable frame rates when the Y-series Core processor stays below its SDP of 7 watts. Most other common tasks, including video playback, don't break this power budget. So, the new processor isn't an eye-popping game platform, but that's no surprise.

Generally, Intel's TDPs are honest. SDP could be a good thing if Intel standardizes the rules and encourages everyone to adopt it.

Tom Halfhill was formerly a senior editor for *Byte* magazine and is now an analyst for *Microprocessor Report*.



Thomas McDonald

**Game Theory**

# IS IT A GAME?: TELOS AND TECHNE

**LIKE DEAR ESTHER** and Journey before it, Proteus has some pundits revving up their "is it a game?" arguments again. It's funny, but I don't recall a similar chariness when we started putting simulations—which arguably include most shooters and RPGs—under the rubric of "game."

I've worked on an old-school game and puzzle magazine for most of my career, and our idea of "games" has a history measured in millennia, not decades. You can sketch a line from Senet to Skyrim, but it won't be a particularly direct one, and it will detour through so many other arts along the way that it becomes too difficult to recognize it as a "game."

That's why games are already part of a subcategory called "interactive entertainment." To go all Aristotle on your ass, the "telos" (purpose) of Proteus may not fit the classical definition of a game, but its "techne" (craftsmanship) does.

I didn't love Proteus (or Dear Esther), but I respect that it tries to do something different and stretch the medium a bit. In Proteus, you just kind of wander around on an island as it changes seasons to the accompaniment of an ambient soundscape. If you like the music of Brian Eno and a 16-bit approach to Impressionist landscapes, it might just scratch an itch. But if you scoff at the idea of a meditative, self-consciously "artistic" interactive experience, my guess is you won't be bothering with Proteus anyway. So why get all heated about what it's called?

Proteus is a tone poem, a mood piece. I'm not dialed into its particular wavelength, but that's more a matter of aesthetic differences than any real complaint about the experience itself. I like that the forms and tools of conventional gaming can be used to make such an individual statement and get it out there for the world to see. We can worry about what to call it later.

You can follow Thomas McDonald on Twitter: @StateOfPlayBlog.

## Shop Chips with CPUBoss

If you like charts and graphs as much as we do, check out the recently launched CPUBoss.com. Its mission is simple: to provide an easy way to search for and compare processors, whether you're in the loop, out of the loop, or feeling downright loopy from research overload. You can move sliders to suit your price range, sort by sheer performance or best value, search for devices that use a specific CPU, and get links to reviews from around the web.

As CPUBoss says, "We can do the legwork by gathering processor specs, benchmarks, and reviews together in one central page. We've built some pretty cool tech to do this." **–PL**

## OCZ Bundles Far Cry 3

OCZ has announced that it will bundle a copy of Far Cry 3 with its 256GB and 512GB Vector SSDs. The offer lasts until July 13, with caveats. For example, you can't get more than two copies of the game, no matter how many qualifying SSDs you buy. And the offer is not valid in China or Africa.

According to our tests, the Vector is one of the fastest SSDs on the planet. It also uses an in-house Indilinx controller instead of the glitchy SandForce of previous models, which gained a reputation for sometimes killing your drive.

For more info, check out www.ocztechnology.com/vector_farcry3. **–TM**

## Windows 8 Getting Re-Surfaced?

Microsoft is reportedly upset at PC makers for failing to ready themselves for the launch of Windows 8 back in October. According to tech website The Register, Microsoft believes OEMs should have been ready with more attractive Windows 8–based touchscreen tablets, and had they been on the ball, the reception would have been much more positive. There's more.

Redmond reportedly provided specific guidance on the hardware that its partners should be using for any machine running Windows 8. Microsoft also provided advice on both high-end and low-end form factors that PC makers should build, including Ultrabooks, hybrid laptops, and traditional notebooks.

"Microsoft is very frustrated with major OEMs who didn't build nearly enough touch systems and are now struggling to find parts and ramp up," an unnamed source told The Register.

For their part, PC makers say that if they followed Microsoft's requirements and stepped up production, they'd essentially be stuck holding onto a bunch of expensive tablets that nobody wants to buy.

In a CNBC interview this January, Chairman Bill Gates asserted that both Windows 8 and the Surface tablet were doing well.

The following month, rumors circulated about Microsoft planning a "reboot" of Windows 8, timed alongside the launch of its Surface Pro tablet, which uses a conventional Intel x86 CPU instead of an ARM chip. Microsoft may have already unveiled its new master plan by the time you read this. **–PL**





Quinn Norton
**Byte Rights**

# TAP ALL THE THINGS

CALEA IS AN 18-year-old wiretapping law that's meant to give law enforcement access to communications. Of course, in 1994, most of us weren't on the net yet, and Congress had just discovered that their secretaries were talking into the telegraph machines. Tapping was a simple affair. All the calls came into one centralized point: the telephone company. The FBI could present the telephone company with a warrant and listen in.

Calea mostly left the Internet alone, but then in 2004, the FBI requested it be expanded to cover services like VoIP and broadband. They got their wish. But of course, there's a problem, and it's not just when random FBI agents decide to ruin the careers of promiscuous generals who haven't committed any crimes. With a service like VoIP and other Internet tools, there's no central office to show up to, no one to install your taps. Insisting on making decentralized Internet software easy to wiretap means only one thing: installing backdoors in software—intentional security vulnerabilities that allow a remote attacker to get your data.

Here's the funny thing about doors, back or otherwise. People go in them. Different kinds of people. Software can't tell if you have a warrant or not. It can't eye your badge suspiciously and call into an office. It can't even tell if you're a human or a piece of exploitation software fuzzing it. Because of this, making the Internet Calea-compliant is one giant insecurity measure. It is American law enforcement demanding the world not only give up a great deal of its potential privacy, but become inherently insecure. And forget about open source, where you could just find backdoors. After all, open source communication tools don't make any sense to American law enforcement; their backdoors are supposed to be their nasty little secrets.

Quinn Norton writes about copyright for Wired News and other publications.

## Michael Dell Buys Dell Inc.

Dell announced that founder and CEO Michael Dell will use his personal finances (and combine forces with investment firm Silver Lake and several international banks) to convert Dell Inc. into a privately owned company. Microsoft is contributing a $2 billion loan toward the purchase, indicating deeper interest in PC hardware after releasing its Surface tablets last year. It seems like this could complicate Dell's recent Linux forays.

Taking a company private has advantages; Dell will no longer have to seek shareholder approval to make major strategic changes, and it will not have to publicly report its financial situation. This can allow the company to try things that might not pay off in the short term, and gives it more control.

If no other challengers step into the Thunderdome with a competing offer, stockholders will receive $13.68 per share in cash, or $24.4 billion dollars in total. Dell Inc. approached its CEO in August about going private, so the announcement is not unexpected. **–TM**



## Office 365 Comes Online

As of February, Microsoft's new subscription-based version of Office, dubbed Office 365, is available worldwide. Microsoft likes to refer to Windows 8 as a reimagining of Windows, and now Office 365 is a "reinvention" of Redmond's popular productivity suite for consumers. But unlike previous versions of Office, Office 365 is only in the cloud.

An annual subscription of Office 365 Home Premium runs $99.99, which breaks down to $8.34 per month. It allows you to use Office 365 across up to five devices, including Windows tablets, PCs, and Macs. It also comes with 20GB of SkyDrive storage and 60 minutes of Skype calling. **–PL**

## AMD's 'Never Settle' Returns

The long, lost marketing magic of game bundling has returned for a new generation of video cards. Last fall, AMD released a bundle of recent triple-A titles called "Never Settle," taking Nvidia's competing offers head-on and upping the ante with additional titles.

AMD's sequel, "Never Settle: Reloaded," refreshes the offer with another batch of all-new titles including Crysis 3, BioShock Infinite, and Tomb Raider. Your options vary by region and by what tier of card you buy (for example, Devil May Cry is not bundled in North America), so check the company's website for deets www.amd.com/never-settlereloaded. **–TM**



# THE LIST

## 8 SOFTWARE EASTER EGGS

### 8 GOOGLE BARREL ROLL

Typing "do a barrel roll" into Google, has your screen doing a 360, paying tribute to a beloved line/move in the game Star Fox 64.



### 7 KILL JOHN ROMERO IN DOOM II

John Romero must have been a pain to work for. Why else would the developers at id Software design a hidden level (accessible by enabling the "no clip" cheat) in Doom II that allows you to kill the giant floating head of the famed game designer?



### 6 DIABLO II COW LEVEL

By combining a Tome of Town Portal and Wirt's PegLeg, players could enter a hidden portal and fight demonic bovine hordes. Unholy cow!



### 5 PIRATE LANGUAGE ON FACEBOOK

Facebook supports over 50 languages including "Pirate English." Enabling this converts Likes to "Arr!"s and turns all of your friends into "Cap'n"s. Walk the plank and try it yourself, you scallywag!



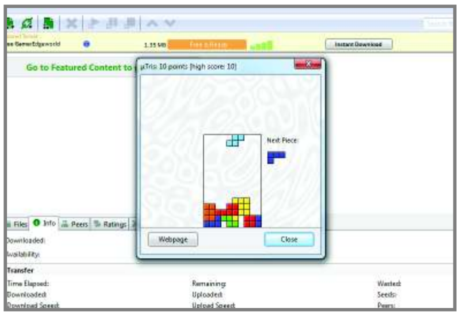

### 4 YAHOO'S EXCLAMATION NOISE

When you click on the exclamation point on Yahoo's logo, you'll hear the company's signature yodel. Yahoo!




### 3 PLAY TETRIS IN UTORRENT

While waiting for your perfectly legal torrents to download, you can kill time by playing Tetris. Access the game by pressing "T" under uTorrent's About section.



### 2 SKYPE'S HIDDEN EMOTICONS

Try typing in "(bear)," "(dance)," and "(ninja)" for some random gestures to send to your friends.




### 1 GOLD CHROME ICON

Bling out your Google Chrome icon by right-clicking the icon, then selecting Properties > Change Icon.

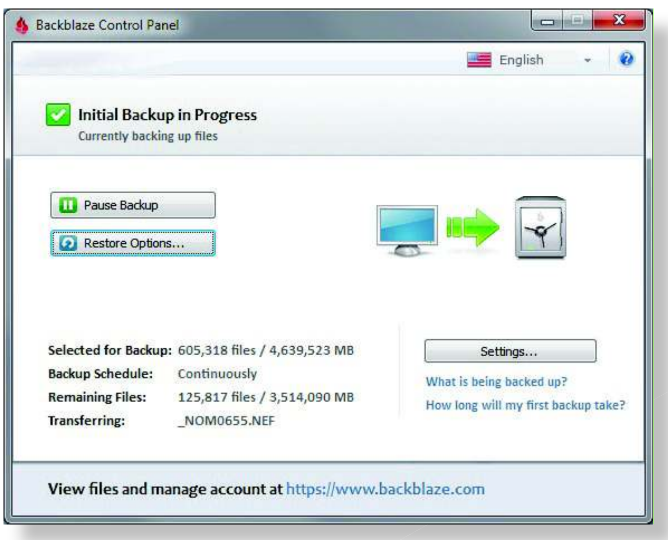


# HEAD TO HEAD

BY JOSH NOREM

# CrashPlan vs. Backblaze

We all know how useful cloud storage is for easy access to all your files from any Internet-enabled location, but there's also an equally killer service known as cloud backup. It lets you back up files to a remote server for retrieval after a disaster strikes, such as a failed hard drive, Hurricane Sandy, an apartment fire, or any other calamity that leaves your PC's local storage permanently damaged. It's in these scenarios that the mirrored RAID inside your home PC or sitting on your desktop will be about as valuable as *Jack Squat*. When your home PC, or town, goes bye-bye, you need offsite backup, so this month we've taken a look at two of the most popular services that offer unlimited backups for a modest sum. May the best cloud win.




Backblaze's desktop application is as bare-bones as they come, but does provide a slew of helpful configuration tweaks.

## Round 1: Features

Both Backblaze and CrashPlan let you install their software, then point to a source directory/drive and have the data sent to an offsite data center for backup, so both contenders cover the basics quite well. However, CrashPlan then goes a few levels beyond the basics, by not only letting you select individual folders on a volume instead of just the entire volume as Backblaze does, but by also letting you send backups to a friend's PC for free, and letting your friend back up to you, as well. The whole process is as easy as typing the friend's email address into a box and having them accept your invitation. All backups are encrypted, so you don't have to worry about peeping Toms. Neither service lets you back up NAS drives.

**Winner: CrashPlan**

## Round 2: Pricing

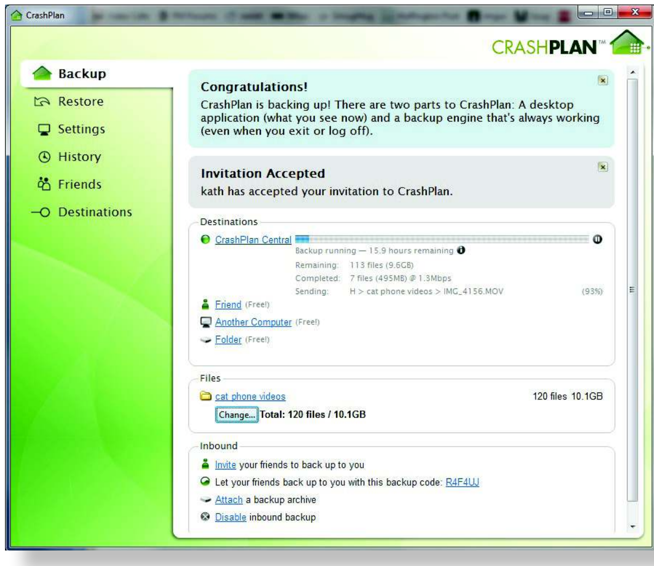
Both services are very close in pricing, but for a single PC the win narrowly goes to Backblaze, as its one-year unlimited data plan is $4.17 per month and CrashPlan's is $5 per month. Even at two years purchased in advance the nod goes to Backblaze, which charges $3.96 a month, compared to CrashPlan's $4.79. However, if you opt to buy four years of CrashPlan—Backblaze limits you to two years of backup at a time—you can secure an exactly comparable $3.96 per month rate, making it a tie.

Both companies also offer a family plan, with CrashPlan coming out on top, as Backblaze charges $5 per month per computer, whereas CrashPlan lets you back up 10 computers for just $12.50 per month. Since each solution has a win here, this one's a very close tie.

**Winner: Tie**

# HEAD

CrashPlan lets you handle all backup and restore options in an easy-to-use desktop application.




### Round 3: Support

This category is a very clear win for CrashPlan, which offers numerous support options, while Backblaze primarily uses an antiquated ticketing system we all know and hate. CrashPlan offers all the standard FAQs and documentation plus a YouTube channel, but more importantly, it offers live chat, email support, *and* phone support. There's also a user discussion forum, but it's mostly bereft of content. Furthermore, CrashPlan is on Twitter, Facebook, G+, and has a blog. Backblaze, on the other hand, only offers a support ticketing system, and lacks live chat or phone support, both of which could be very helpful in situations involving data loss. Backblaze is also on Facebook, Twitter, G+, YouTube, and has a blog, but loses this round due to its limited direct-contact options.

**Winner: CrashPlan**

### Round 4: Restore Options

This is a tough category to call because both services offer a unique proposition. Backblaze keeps up to four weeks of file versions, while CrashPlan keeps your files forever, or until you cancel your account, so the advantage goes to CrashPlan for older file-version retrieval. If and when a drive failure or similar cataclysm causes you to need all your files, CrashPlan simply lets you download whatever it has, one file at a time, for no charge. We love "free" and all, but that could take months for a few terabytes of storage. Backblaze will copy the files to a 32GB or 64GB flash drive for $99, or burn them to a USB drive as large as 3TB for $189, which is pricey but time-saving, and we love it. Backblaze lets you download any files for free as well. Since it offers terabyte restores via physical storage, Backblaze gets the nod.

**Winner: Backblaze**

### Round 5: Ease of Use

This is another close category, as both provide a simple, clean interface to manage the backup and restore process, but CrashPlan provides a lot more options and information, so it gets the nod. Specifically, CrashPlan lets you select which folders to back up via a folder tree, whereas Backblaze forces you to just select individual volumes. CrashPlan also shows you the file name being backed up, the current speed, time remaining, and more. More importantly, CrashPlan sent us emails letting us know the status of backups, while Backblaze does not. Both offer fine-tuning of the backup process, including file exclusions, schedules, and event logs, but CrashPlan is easier to use, simply because it gives the end user more control. Some might call that more confusing, but to us it equals peace of mind.

**Winner: CrashPlan**

## And the Winner Is...

This was another hard-fought head-to-head, with both sides trading blows in every category, but in the end, the winner is **CrashPlan** by the skin of its cloud. Both backup products get the job done easily and effectively, but it was CrashPlan's abundance of options, both for backups as well as support, that pushed it over the finish line first. We'd like to take a minute, though, to give kudos to both services for offering a very fair price for unlimited backups, which is a godsend for people like us with several terabytes of data to secure. Other services, like Mozy and Carbonite, are not set up to handle such large data sets in an affordable manner, so you can forget about sending them 4TB. Mozy charges $10 a month for 125GB, and $2 for every 20GB extra, so 4TB would cost you more than $400 a month. Carbonite is $100 per year unlimited, so it's still very expensive compared to the two programs featured here. Either way, you now know what the best cloud backup solution is—we hope you never have to use it.

# DOCTOR

THIS MONTH THE DOCTOR TACKLES...

## > Recovering a Laptop RAID
## > PSU Questions
## > Wireless Uploads

### Recovering Data from a Laptop RAID

I have an MSI GT683 laptop with two 500GB hard drives in RAID 0. My motherboard failed under warranty. The laptop is not worth repairing, so they are sending me a new laptop. The new one is an MSI GT783R with two 750GB hard drives in RAID 0.

The techs did send back the drives from the old laptop in the hopes that I could recover data from the RAID. Could someone explain how to remove the data from two hard drives in RAID 0 and reinstall on my new laptop? I have a stand-alone hard drive dock used to clone hard drives and also an adapter used to transfer info from one hard drive to another. Unfortunately, neither device works in my situation. How do I get the data from my old drives?

**—Dan Tiefenbach**

**THE DOCTOR RESPONDS:** It's difficult to restore data from a RAID without using the same chipset/RAID controller as was used to create it. However, given how similar the new laptop is to the old one, you may be in luck. Since you were able to remove the drives from your old laptop, you ought to be able to do the same on your new laptop. And since both are Sandy Bridge notebooks in the same general product line from the same vendor and both use the same HM67 chipset, your old RAID should be visible on the new computer once you have enabled it in the BIOS. Replace the 750GB drives in the new laptop with the 500GB drives from the old laptop. Hopefully, the RAID will be recognized and you can boot from the drives. If so, copy the data you need to an external drive. Then remove the 500GB drives and replace the 750GB drives in the same configuration they were in when you got the new laptop, and move the recovered data to the new laptop. If you're a bit skittish about swapping the drives, you can try file recovery software such as Quetek's File Scavenger available from Quetek.com. We've long been fans of File Scavenger as a recovery tool.

### No More Room on the SSD

Nine months ago, I put together a sweet little system. Almost every article I read recommended a 120GB boot SSD paired with a bigger mechanical-storage drive. This may have been practical then, as SSDs were notoriously expensive at the time of this build. However, it is nine months later and my SSD is nearly full! I have 6.89GB free! I wish I had bought a bigger boot drive, even with the exorbitant prices of the time. You are still recommending these small drives for your budget and intermediate builds.

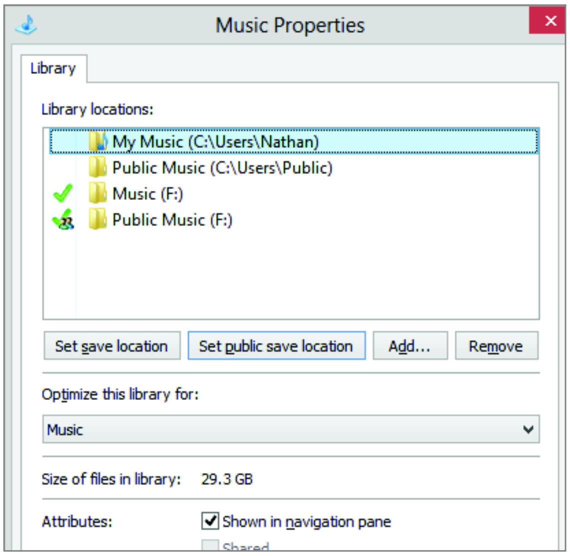
Let me give my advice to anyone considering building a computer with these miniscule drives: don't! I don't even have any games on mine.

I've picked up bits and pieces of articles about how to conserve space on boot drives, but apparently not enough. Could you go through step-by-step all the ways you know of to make Windows send the proper data to the storage drive so I could at least put one game on my boot drive? Could you also recommend a good program that could clean the junk off of my boot drive?

**—Paul Lamb**

**THE DOCTOR RESPONDS:** You're right, SSDs are now cheap enough that you should be getting at least a 250GB model as your boot drive, to avoid the kind of trouble you're having now. Let's see if we can't free up some space on your 120GB drive now, though.

First, make sure the default save locations for each of your media Libraries points to a folder on your storage drive. By default, those libraries save to your SSD. That's bad.




Set your default Library locations to a storage drive to keep space-hogging files off of your SSD.

↘ submit your questions to: doctor@maximumpc.com

Go to Explorer and right-click your Documents library and select Properties. Under Library Locations click Add, go to your storage drive, create a new folder called Documents, and then select Include Location. Back under Library Locations, select the folder you just created and hit "Set save location." Do this for each Library—music, documents, video, pictures, and any other libraries you've created. Be sure to move your public libraries, too, if you plan on sharing music on your network.

Now, move any documents from their original locations on your boot drive (say, My Music) to the new location on your storage drive. Make sure they've copied over correctly and then delete them from your C:\ drive. This should free up a lot of space. You should also go back to each Library's Properties menu and remove the old C:\ drive locations.

You should also make a Downloads folder on your storage drive and make sure your browsers download to that folder rather than the default, which is in My Documents.

Finally, download WinDirStat (free, www.windirstat.info). Run it on your C:\ drive and it'll give you a visual representation of exactly what's taking up space. Move any lingering documents to the storage drive. Don't just go deleting large files willy-nilly, though.

## Three Questions about Power Supplies

I recently upgraded my HP Blackbird 002 with a P9X79 Deluxe with a Core i7-3820, a Samsung 840 Pro with a Barracuda 3TB for archive, and 16GB of Corsair Dominator Platinum 1866. I'm still using the water cooler that came with the original system, and have two XFX Radeon HD 6950s in CrossFire. Every once in a while, the computer will trip a breaker forcing me to switch the computer onto one circuit and have my peripherals plugged into another. My questions are these: Would swapping out the 3-year-old power supply for, say, a modern Corsair modular PSU be more energy efficient? Is 1,100W overkill for my system as listed above? Would I be better served with an 860W PSU? Last, if I swap out PSUs, can I use the existing modular power-cabling or is that just a horribly bad idea?

**—Matthew Bryington**

**THE DOCTOR RESPONDS:** Yes, a modern power supply should be more efficient than the behemoth that came with the Blackbird. You mentioned Corsair and an 860W PSU, so you've clearly been doing some research. Corsair's AX860 PSU is 80 Plus Platinum certified, so it's very energy efficient. It's also fully modular and it should be more than enough power for your system. To answer your third question, no, you can't use the same modular power cabling. It won't fit and even if it did, it's a bad idea. Take the opportunity to do a fresh rewire. And don't worry—even though new PSUs don't have that 10-pin power connector for the SATA backplane, HP in its wisdom enabled the backplane to be powered by one 4-pin Molex connector or two SATA power connectors instead. That backplane will work just fine for your current drives, even the SSD, if you get a 3.5-inch-to-2.5-inch adapter that fits (IcyDock makes one). The backplane is just a straight pass-through and you will still get 6Gb/s SATA speeds out of a 6Gb/s SATA drive as long as it's plugged from the backplane into a 6Gb/s SATA port. You didn't ask, but the Doc thought he'd mention it anyway, since he had to figure this out recently.




# THE PC BUILDER'S BIBLE

## Time-tested tips for PC building that will help you avoid common pitfalls and enjoy a more fulfilling DIY experience

**BY GORDON MAH UNG, NATHAN EDWARDS, DAVID MURPHY**

PC builders don't drop out of their mommies with a Phillips head screwdriver in one hand, a Leatherman in the other, and start winning PC-building contests. No, most experienced PC builders accumulate their knowledge through horrible mistakes, case scars and flesh wounds, and the sorrow of having to completely take apart a machine they just assembled because a single, crucial step was neglected at some point in the process.

But it doesn't have to be that way. Budding and even experienced PC builders can benefit from the wisdom of others. Thus, in an effort to spare you years of apprenticeship and trial-by-fire—not to mention an unplanned appearance on *The World's Funniest PC-Building Mistakes*—we've assembled the very best PC building tips we've acquired over our years of building, including some choice pointers from the professionals.


WD Black
Desktop Hard Drive
Twin Frozr
msi
VIPER
PATRIOT
MEMORY
HDMI
HIGH DEFINITION MULTIMEDIA INTERFACE
V284 VER: 2.0
PRODUCT OF CHINA

# PREP YOUR CASE PROPERLY

Fight the urge to begin screwing down components faster than you can tear open an antistatic bag. Instead, take a step back, breathe three times, and plan out your build.







### TIP 1: HAVE A CABLE PLAN

You've finished installing all of your case's hardware and, like a number of PC builders, you've saved your cable routing for last. D'oh! It will always go a lot smoother if you plan out how you're going to stuff the various cords around your case *before* you fill your system with hardware—*especially* if you're going the full distance and deploying a ton of fans, a huge CPU cooler, water-cooling tubes, etc. For example, trying to run the ATX12V/EPS12V cord from your power supply to the top of your motherboard might very well require you to remove your aftermarket CPU cooler if it's blocking access to the connector. Save yourself a lot of time and heartache by connecting that cable... first!

### TIP 2: PLAN YOUR PART ORDER

If you're rocking a case the size of the monolith from *2001: A Space Odyssey*, skip this tip. Folks with smaller chassis, however, will want to keep build order in mind as they go about creating their masterpiece. We recommend going outside in: Get the fans, hard drives, and optical drives situated before you drop in your motherboard, video card, and power supply. As in the step before, the power-supply cables will prove to be an interesting challenge—make sure you're saving space in your cramped chassis for your rat's nest of cables if your case doesn't present you with an easy way to stuff them between the back of the motherboard tray and the side panel.

### TIP 3: OUR STAND ON STANDOFFS

Ask anyone how tightly you should turn the standoffs for your motherboard and you'll get a thousand different replies. Some recommend going fingers-only tight—but that might very well cause the standoff to turn out with the screw the next time you pull out your mobo. You could grab a 5mm or 3/16-inch socket to give your twisting a bit more *oomph,* but you don't want to tighten the standoff so much that it strips the metal of the hole on the case itself. Our expert recommendation? Finger-tighten if you're the cautious type. If you're daring, use a tool to give the standoffs a spin until they stop moving, then go one-quarter of a turn past that. No more!

## SCREW RECOGNITION GUIDE

There are four common screws used to build every PC. If you're salty enough, you should be able to reach into a bucket of them and, by feel, pull out the right one.



**THUMBSCREW**

The thumbscrew usually uses the same thread pitch per inch as the #6-32 screw and is provided on nicer cases to fasten the GPU and side panels. In a pinch, these screws can be used on the hard drive and motherboard if there's enough clearance.



**#6-32**

The course-thread #6-32 in hex-head is the most important screw in your PC and is used to mount everything from a hard drive, to the side panel, GPU, and PSU. In most cases (but not all) it's also used on the mobo. It can also be seen with a flat head or round head.



**FAN SCREW**

This course little bastard is used to mount plastic fans to your case. It works by cutting into the plastic of the fan when you screw it down. Yeah, we know, not exactly a precision instrument but it works well enough—until you strip out the hole in the fan.



**M3 HEX**

The fine-thread M3 hex or round-head screw has two jobs: the optical drive and the SSD. People commonly mistake the M3 for the course #6-32 and use them to screw down the motherboard, but the ill-fitting screws will eventually back out.



## TIP 4: SHORT YOUR PSU

There are times when you might need to fire up your power supply to test something on your chassis—lighting or fans, for example—but you don't want to boot (or haven't even connected) the rest of your system. This is an essential step when you're priming the pump for a liquid-cooling setup. Grab a paperclip, unfold it, and cover its central portion with electrical tape, for safety's sake. (Yes, we know this is a risk-free procedure, but still.) If your standard ATX12V PSU is color-coded, jam one end of the paperclip into the big ATX Main Power Connector for the green wire and the other end into any black-wire connection. Plug in some kind of device to your PSU—such as a fan, to put a load on it—and then plug your PSU into the wall. Voilà—on it goes, and you can commence testing.



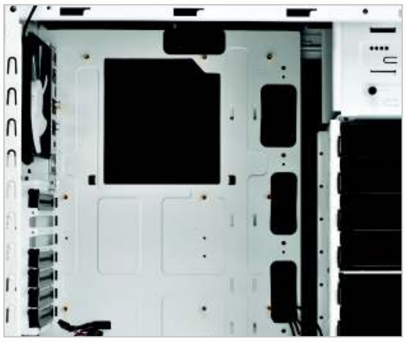
## TIP 6: CONSIDER FRONT-PANEL COMPATIBILITY

Does your front panel match your motherboard? This can be an issue when you're upgrading parts piecemeal. Suppose, for example, that you're rocking USB 3.0 pass-through cables on your case (they look like standard USB cables), but your upgraded motherboard supports an internal header for USB 3.0. Or, worse, what if your case only supports USB 2.0? You're going to want to take inventory of just what your motherboard and case can handle as far as connections go. If they don't match up, make some adjustments—assuming you use these connections—before you go through the laborious process of building your rig. Incidentally, we have plenty of fixes for this issue, if a new mobo (or case) is just out of the question—check our Doo-Dads sidebar on page 30!



## STEP 5: I/O SHIELD INSERTION

I wish we had we a nickel for every time we forgot to install the I/O shield after assembling more than 90 percent of our system. Here's the deal: Grab it out of your motherboard box and, before you install the motherboard itself, push the I/O shield firmly into place on the rear of your chassis. Remember, you install this sucker from the inside, facing out—the recessed area outlining the I/O shield should snap right into the appropriate area on the inside-rear of your chassis. If you're still a little confused, remember: The bent notches around some of the cutouts on the I/O shield should be folded facing into your case, not the other way around.



## STEP 7: COUNT YOUR MOUNTS

It goes without saying, but make sure you take a look at your case and install your motherboard's standoffs in the correct spots for your ATX/microATX/Mini-ITX/etc. motherboard. Ignore the other holes, lest you accidentally put a standoff where it shouldn't be and short-circuit your motherboard. You'll want to install as many screws as you have standoffs; if you're missing a few screws, then at least try to attach your motherboard to your tray in an even fashion—perhaps making an "X" pattern instead of going for the full, nine-standoff grid, for example. When in doubt, make sure you're "distributing the weight," as it were!

# DIY VS. BUY

When we solicited system builders for their expert building tips, a few of the PC vendors told us to go make like bacteria and self-replicate. After all, they argued, it's far better to buy a system from people who do it for a living. Is it really, though? Here are a few key arguments the pros have in their favor.

### YOU DON'T HAVE INTEL'S PHONE NUMBER

OEMs, even small ones, have Intel, AMD, Nvidia, and pretty much all of the hardware makers on speed-dial when a problem crops up. And believe us, they get the attention a DIYer couldn't imagine in their wildest water-cooled dreams.

### YOU PAY RETAIL

Sure, you might get a killer deal on Slickdeals.net for a particular component, but you mostly pay full retail for parts. OEMs buy parts by the truck-load, and if they're big enough, by the freight-train-load. That gives them price margins you'll never touch.

### THEY HAVE ENGINEERS

Unlike most DIYers, OEMs, especially the big boys, have engineers that can tell them, well, no you can't run that much hardware with that small a PSU, or, no, that heatsink isn't up to the job. All you have is a bunch of washed-up hacks at a magazine.

### THEY GET THE TRUTH

When dealing with the press and public, most corporations would rather ignore a problem than admit they screwed up. With system OEMs, however, parts makers are usually far more frank in warning them not to use one component with another, and then swear them to an NDA.

# TOOLS OF THE TRADE

To build a modern PC, the only tool you *really* need is a $3.99 screwdriver from the local ACE hardware store, but that doesn't mean a few additional tools can't make your PC building life a whole lot easier.

**SOCKET**
The vast majority of cases use brass standoff studs to mount a mobo. The ghetto method (which we admit to employing at times) is to use a pair of pliers on them. A simple 5mm or 3/16 socket is actually the right tool for the job.





**MAGNET**
Magnetizing your screwdrivers can make them much more effective in tight or hard-to-reach spots. This is where a dead hard drive comes in handy. Take it apart and extract the heavy-duty magnet that resides under the actuator. Let your tools rest on this bad boy a few seconds to become magnetized.




**LIGHT SOURCE**
A flashlight or headlamp can make your build go a lot easier. Half our staff prefers handheld "torches," the other favors the head-mounted variety. This Fenix PD32 Ultimate Edition ($70, www.fenixlight.com) puts out a nice warm, floodlight-like beam at up to 740 lumens.

**QUALITY SCREWDRIVER**
While you can get by with the $3.99 jobbie from the local ACE to build a PC, having a good-quality ratcheting screwdriver, such as this vintage Snap-On SSDMR4 ($64, www.snapon.com), puts less strain on your hand and wrist, and can make your build a true joy.






**ARCTICLEAN**
Although rubbing alcohol will work for cleaning up a CPU, we prefer ArctiClean, which requires less elbow grease. If you build more than one system, invest in some.




**LEATHERMAN**
What can we say, it's the Swiss Army Knife of PC building. If a tool's not on there, you don't need it.

# HAVE A FAN PLAN

It doesn't matter how clean your wiring is or how powerful your components are if you can't keep them cool. A good fan setup can turn a hot, dusty, and noisy PC into a cool, quiet, clean one. Here are the top tips to look for, whether you're building a brand-new PC or renovating an older one.



### TIP 1: FAN PLACEMENT BASICS

The traditional setup is to have a 12cm intake fan in the front of the case, right in front of the hard drives, and a 12cm exhaust fan at the top-rear of the case next to the motherboard I/O ports. This allows simple, unidirectional travel so that air goes first over the hard drives, then over the heat-producing GPU and CPU and motherboard, and then out the rear of the case near the top, because warm air rises. As components have become more powerful, they've started putting out more heat, and case manufacturers have had to add fans to keep up. The most common additions are a side-panel fan for added GPU cooling, and additional exhaust fans at the top of the case. Make sure you have intake fans in the front and exhaust fans in the rear. Side-panel fans should be intake, not exhaust, and top-panel fans should generally be exhaust.

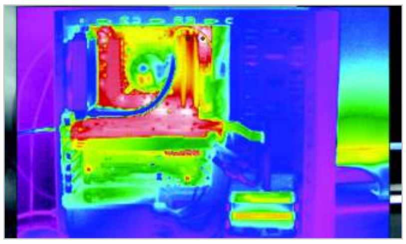
#### POSITIVE AIRFLOW AND FILTRATION

It's best to have slightly more air intake than exhaust. This creates positive air pressure, which reduces "dead spots" in the case, without air circulation, and it prevents dust from coming in through unfiltered openings. Make sure your intake fans have dust filters, preferably removable. Clean them every month, especially if you have pets or carpets. If your case doesn't come with dust filters, don't buy it. If it's too late, you can get dust filters for a couple of bucks on Newegg. Dust is a great insulator *and* a great killer of components.

Put filtered intake fans on the front panel first, then the side panel if you need more intake (and your case can accommodate side-panel fans). Stick with the standard rear exhaust fan, and add a top exhaust if necessary. There's no need to filter the exhaust fans; no sense trapping in dust.

#### KNOW WHAT NEEDS TO BE COOLED

If you're air-cooling, the airflow from your case fans and CPU cooler should be sufficient to cool motherboard components such as the voltage regulation modules and your south bridge, but if you're water-cooling your CPU and GPU, those mobo components can overheat from lack of airflow. If you're water-cooling and plan to overclock, consider adding auxiliary cooling to your VRMs and chipset, too. A simple fan is generally enough to keep them cool. If you have a radiator mounted to the top of your case, consider mounting its fans as intake rather than exhaust so you can get more air flowing over the north half of the motherboard. As you can see from the thermal image of a water-cooled rig, the VRMs and the chipset (in red) get the hottest.



Courtesy of Falcon Northwest

### TIP 2: THREE PINS OR FOUR?

Most case fans use 3-pin connectors, but some use 4-pin. Most CPU cooler fans use 4-pin. You can control 3-pin fans by changing the voltage to the fans—via the BIOS or a hardware fan controller. You can control 4-pin fans by way of PWM (pulse width modulation) and speeds can be changed in software, and sometimes in the BIOS. Some BIOSes let you switch the CPU FAN headers between voltage and PWM control. Either is fine, although PWM fans can often be tuned to lower speeds than voltage-regulated fans, which usually need at least 50 percent power to spin up, so PWM fans can run more quietly.

### TIP 3: MOBO CONTROL OR FAN CONTROLLER

If your motherboard has enough fan headers to control all your case fans, there's nothing wrong with using your mobo to do to the job. Some motherboards, like Asus's new ones, include utilities that "auto-tune" your fans based on their speed capabilities and where they are in the case.

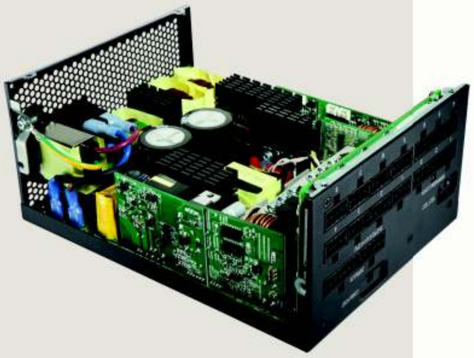
If you have a *lot* of fans or want really fine-grain control, you can get a stand-alone fan controller. Many cases come with built-in fan controllers, though most are rudimentary. Some top-end ones have fan-speed readouts and some have temperature sensors, so you can tweak until it's just right.

# PSU GUIDELINES

Don't overdo it, but play it safe

With today's efficient CPUs and GPUs, you may not need the behemoth PSU you've been eying. We used three online PSU calculators from reputable sources to configure a box built on a Core i7-3930K, a GeForce GTX 680, four DIMMs, an SSD, HDD, ODD, and four fans. The recommendations ranged from 400 to 650 watts. That may sound low to you, but we have one editor who runs a GeForce GTX 690, overclocked Ivy Bridge CPU, and six HDDs on a name-brand 650-watt unit with no issues "so far."

Our general guidance, though, is still to err on the side of caution by building in a little more headroom than you need. If a PSU calculator recommends a 600W for you, think about a 750W. This overprovisioning will help you in the hot summer months when your PSU will be pushed to its limits. Remember, an overloaded PSU will have a shorter life.



# THE PROS CHIME IN

We do it for fun, but the OEMs—the professionals—do it for a living. We asked a few key players for some tips to aid the common nerd.



**KELT REEVES, FALCON NORTHWEST**

"Your case is the critical first build decision, and where DIYers often buy mainly on price or looks. Start by considering size and form factor. With 4TB drives, and even Mini-ITX motherboards loaded with features, few people really need tons of expansion anymore. Next, investigate the airflow patterns and noise, primarily determined by its cooling fans. Fans are where chassis makers tend to skimp, as four high-quality fans cost more than a cheap case. Your case is what you'll look at, interact with, and probably keep longer than most components. So devote some thought and budget to a quality enclosure."



**JORGE PERCIVAL, ORIGIN PC**

"When building a custom liquid-cooling loop, it is important to first test all components for any leaks, visualize the entire loop, and check where components are going to be located, so you gain a better idea of how the liquid will flow through the blocks. Always have the reservoir above the pump—this will guarantee your pump never runs dry. If possible, always dump heat by having the liquid go through a radiator before going back to another high-heat component. Try to avoid having the GPU liquid going right into the CPU without dumping heat. This is a common mistake people can make. Before filling for the first time, check all fittings and plugs to make sure they are covered."



**HARJIT CHANA, DIGITAL STORM**

"Cable management is important not just for airflow and aesthetic reasons, but it makes future upgrades easier. When routing your cables, instead of bundling all of them together, separate your power supply, SATA, and chassis audio/USB cables into their own smaller bundles."



**ADRIAN HUNTER, GEEKBOX**

"Take your time. Chances are, you don't build several machines per day. As such, the level of satisfaction and joy you will receive by allotting yourself enough time to build your system will ensure that both the system and your experience are rewarding. Instead of rushing through your build, consider giving yourself three days to perfect every aspect of your build. From inspection of your new parts and careful integration to beautiful wiring—giving yourself enough time to critique your work before turning the machine on will pay in spades. Also pre-test your hardware before implementing a complex liquid-cooling solution. More often than not, this will save you countless hours of dealing with a possible headache. In the process, you can also find a baseline of how your system performs before your massive cooling upgrade. Once you have concluded you have a solid foundation to build upon, construct your cooling loop outside of your build and leak-test for 24 hours. By spending the time to follow these steps, you will avoid landmines that are all too prevalent within the enthusiast community."



**JOSH COVINGTON, VELOCITY MICRO**

"Heat is your enemy. When building an enthusiast-level machine, your goal should be finding ways to improve airflow and pull heat away from vital components to increase the longevity and overall reliability of the system. But this doesn't mean you have to do something crazy like invert the components, invest in an insane liquid-cooling solution, or install obnoxiously loud fans. We've found the simplest and most effective way to keep a system cool is to wire as neatly and cleanly as possible—this keeps the air moving through and out like it was designed to."



**MISHA TROSHIN, AVA DIRECT**

"Consider going above what you need for your power supply by at least 20 percent. Avoid cases without sufficient space behind the motherboard tray for cable routing. Using cases with hard drive cages facing the side panel will help improve internal aesthetics. Do not underestimate Electrostatic Discharge (ESD) significance. Use a grounding kit when handling memory or other sensitive components, especially in dry air conditions. Be aware that many of today's motherboards do not support Smart Fan functionality with non-PWM fans, so be sure to get PWM fans to avoid excessive noise. When overclocking your system, give preference to Offset Mode. If computer-building isn't your hobby, to save time and money go to a professional builder with fair pricing and lifecycle support."

# MOTHERBOARD/CPU MATTERS

Setting up the motherboard and CPU is often the most daunting task to a new PC builder. If you step back and think about it, though, installing the mobo and CPU are a lot less intensive than wiring up the PC in a neat manner. It's really not that bad. Still, there are a few basic guidelines every builder should heed.

### TIP 1: DON'T OVERTIGHTEN IT

A rookie mistake to avoid when building your system is screwing in the board so tight with the first screw that you can't nudge it about. Instead, after you've put in the first screw, leave it sloppy enough so you can shift the board. If your case isn't the best quality and has very loose tolerances, you may even want to put a card in the slot to make sure the board is in properly. Some newer cases even include a center mounting point that doesn't need to be screwed down. Instead, you plop in your board and use the center point to orient your board to the exact position it needs to be.

### TIP 2: KEEP IT PARALLEL

Intel actually makes a special field insertion and removal tool for its CPUs, but unless you're building systems all day, your fingers can do the walking. The proper way to insert a land grid array CPU is to hold it parallel to the socket and gently lower it straight in. Don't drop one side in and then the other, or try to slide it around the socket—you may kill your motherboard.



### TIP 3: MIND THE NOTCHES

CPUs usually have small triangles to denote where to insert the CPU, but we've found the mark is difficult to see under poor lighting. In addition to the golden triangle that either lines up with a triangle or notched corner on the socket, you can also use the notches cut into the side of the CPU to help guide your proc into its home.

### TIP 4: GETTING THE RAM RIGHT

Before you place RAM in your board, always read the manual for the proper placement of DIMMs. Different memory controllers in different Intel and AMD CPUs means you have a very high probability of hobbling your memory bandwidth or possibly preventing your box from even booting at all if the RAM is in the incorrect slots. One of the most common mistakes builders make is not inserting the RAM with enough force into the slots. Most people do this because they don't want to damage the motherboard, but boards are actually pretty tough. Once you've made sure the RAM is properly lined up with the key, or notch, in the RAM slot, push the module into place until the arms lock on both sides. You should barely be able to see the contacts if properly installed.

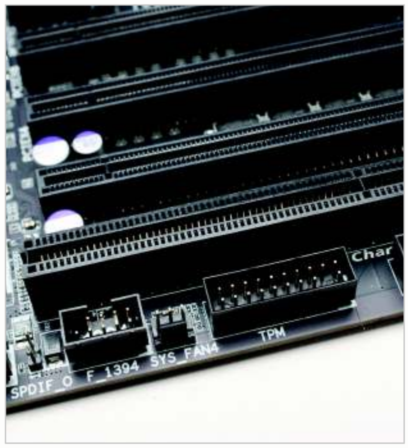
### TIP 5: GREASE IT GOOD

Like fan holes, everyone has an opinion on the proper application of thermal paste. How much, how little, and where it goes are issues of hot contention. Two methods have worked well for us: Put a dab the size of a grain of rice or BB smack-dab in the center of the heat spreader and then sandwich the cooler on it. This will spread the paste out in the center of the CPU where the cores are. The other method that also works well is to put the same amount of thermal paste on the CPU, and stick your finger into a clean plastic bag and evenly spread it over the CPU heat spreader. The real key to applying thermal paste is not to use so much that it acts as an insulator. If it's oozing out the sides, you went too far. Just because the heatsink came with a tube, doesn't mean you should use it all.



### TIP 6: KNOW IEEE 1394 FROM USB 2.0

We were never huge fans of how IEEE 1394 (aka FireWire) was implemented. Among the many reasons we're not sorry to see FireWire go is the tendency to mix up FireWire headers and USB headers. Both have similar pin-outs, so it's easy to accidentally plug your PC's front USB 2.0 ports into a FireWire header. Since FireWire carries a crapload of power, and on the wrong pins for USB, you could easily damage your devices in a heartbeat.




### TIP 7: BE A COVER SNOB

True connoisseurs of build techniques will show their colors when talking about the plastic cover on the LGA2011 socket. Some say the right method is to leave the cover in place and let the CPU pop it out when you close the lid. Others say to just pop it out with your finger first. Both cite Intel as their source. Who's right? Both, actually. We've seen official Intel videos showing both methods in use. Both ways work and neither is wrong. More importantly, you may be tempted to toss the cheap plastic cover from your motherboard socket, but don't. Most motherboard companies require that the plastic piece be in place and protecting the socket should you ever return the board for repair or replacement.

# GPU WISDOM

Installing a modern GPU doesn't take much effort beyond ensuring adequate airflow going to it. Still, for more advanced users, there are a few things to consider when you run multiple GPUs, as well as thinking—oddly enough—about your storage options before you install your GPU. Intrigued? Read on.

### TIP 1: A BRIDGE TOO FAR

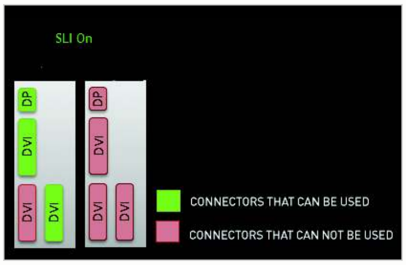
For those of you building multi-GPU systems, it's always confusing how to set up the bridge properly. On the Nvidia side, a given motherboard should come with multicard bridges for all of the SLI configurations the board supports, so don't expect a four-way SLI bridge on your microATX board. On the AMD side, the bridges come packaged with the GPU.




Installing the bridge on a two-card SLI build is always confusing. Do you put the bridge on the front or rear connectors? The answer: It doesn't really matter. In fact, we tested a pair of GeForce GTX 680 cards using the latest drivers and found no difference between the two scenarios. Still, for some reason, we prefer to put the bridge on the connectors closer to the rear of the PC. AMD's CrossFireX is the same, with the bridge location making no discernible performance difference.

### TIP 2: QUAD-SLI PORT PROTOCOL

Few of us will be running two GeForce GTX 690 cards, but there's a secret to doing it correctly. Most of us assume that all of the connectors work fine in quad SLI. That's not true, and using ports other than those designated for quad-SLI use will result in unstable behavior that most experienced builders will attribute to a bad PSU, bad RAM, or other hardware issue. When you are running quad SLI, the first DVI port will give you issues. Instead, plug your monitor into the second or third DVI port on the top GPU, or into the DisplayPort on the first video card, to avoid random lockups related to an improper configuration.




### TIP 4: USE SEPARATE CABLES

If your GPU requires a pair of 6-pin or a 6-pin plus 8-pin connector, consider using separate cables from the PSU rather than a combination cable that places the load on the same cable. If you have a borderline-undersize PSU or low-quality PSU, it may not be capable of supplying all the power the GPU needs, so if the option is available to use two different cables to power up your GPU, do so.

### TIP 5: MIND THE SLOTS

All of the slots in a motherboard might look the same, but the wiring under those slots often varies. For optimal performance, use the top slot for your GPU, as it should be the x16 physical and x16 electrical slot. We'll be honest, a x8 PCIe slot on third-gen technology provides the same bandwidth as a x16 PCIe slot on second-gen—but there should be absolutely no reason in any modern motherboard or case or odd heatsink that should prevent you from using the top slot.

### TIP 6: INSTALL SATA FIRST

If you're wondering why we put a storage tip within the GPU section, it's because the two



go hand-in-hand. That's because most newbs make the mistake of installing their double-wide GPU before they wire up their drives, only to find they can't access their internal SATA ports without pulling the GPU. That's why we recommend that you install your SATA cables first. In fact, we recommend installing more SATA cables than you need.

## PC-BUILDING DOO-DADS

The vast majority of issues you'll run into with your PC are usually related to mismatched or short wiring. To help you solve those problems, we've collected a handful of the most useful and often ignored pieces of hardware that every PC DIYer should know about.



### EXTENSION CABLES

Phobya's sleeved extension cables let you route your case's power switch, reset, and LEDs the way you want to—not strung tight as a piano wire.
$9, www.phobya.com

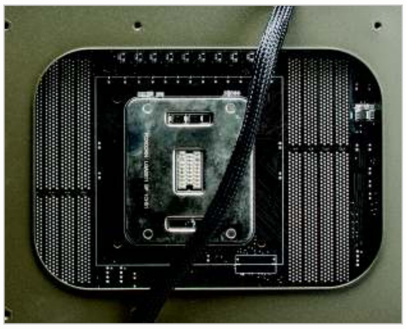


### USB 2.0–TO–USB 3.0 ADAPTER

If your case has USB 3.0 front ports, but your older motherboard doesn't, this Silverstone adapter lets you press those front ports into action, albeit at slower USB 2.0 speeds.
$10, www.silverstonetek.com

# COOLER AND STORAGE TIPS

With instructions typically smaller than a Bazooka Joe comic strip, the process of mounting a cooler is often the most challenging task. Here are a few tips to keep you out of trouble.



### TIP 1: INSIDE OR OUT?

Most new cases have big cutouts in the mobo tray to allow you to install a CPU cooler and its backplane after you've installed your motherboard, but those are more useful for someone swapping out a cooler in an existing build. You should install at least the cooler's backplate and mounting system onto the motherboard before putting the motherboard into your case. It'll probably be easier to install the cooler and RAM as well, to make sure they play well together. The only reason to install the cooler after the motherboard is in the case is if it's a tricky fit, or there's stuff (like the ATX12V/EPS12V 8-pin connector or a motherboard mount) you won't be able to reach once the cooler is installed.




### TIP 2: RAM CLEARANCE

Certain big CPU coolers like the Noctua NH-D14 or Phanteks PH-TC14PE overhang one or more RAM slots, so RAM with big heatsinks may not fit. RAM heat spreaders are almost entirely for looks, while the cooler is mostly for performance, so when in doubt, go with the CPU cooler.

### TIP 3: USE THE RIGHT PARTS

Aftermarket cooler makers are notorious for not clearly labeling the brackets, screws, and bits that ship with their coolers. Sometimes it's a faint ink stamp on the bag that you can hardly read. So before you rip open the bags like a kid on Christmas, make sure you only open the bag you need. They're usually separated by socket type. You don't want to use the bracket for AM3+ with the screws for LGA1155 and the mount for LGA2011.

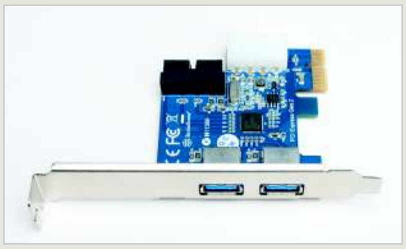



### TIP 4: LABEL YOUR CABLES

When you install your cables, we recommend that you install more cables than you need. If you are only running three drives in your box, go ahead and plug in the SATA cables for four or five and run the cables to where those drives will go. This saves you the trouble of having to pull your GPU should you need to add a second SSD or HDD down the road. While you're at it, consider labeling the cables so you know which cables go to SATA 6Gb/s and which go to SATA 3Gb/s on your Intel board. AMD users, use your Nelson Muntz laugh on the Intel users.

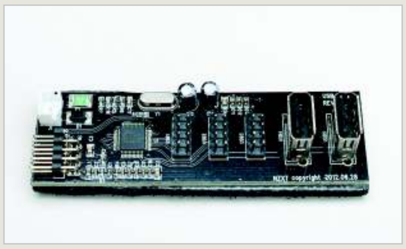
### TIP 5: TORQUE TALK

Read the instructions then read them again. Most of the time you'll tighten the mounting screws until they stop turning. Don't overtighten from that point or you could damage your mounting screws, backplate, cooler, or even motherboard.



### USB 3.0 CARD

If you'd rather have your front USB 3.0 ports run at full speed, this Silverstone PCIe USB 3.0 card gives your mobo SuperSpeed capability and even two more ports out the rear.
$29, www.silverstonetek.com



### USB EXPANSION

Those "smart" liquid coolers, PSUs, and other components can easily eat up all of your internal USB headers. NZXT's IU01 Internal USB Expansion hub lets you turn one USB 2.0 header into three and gives you two more internal USB plugs, too.
$19, www.nzxt.com



### MORE EXTENSION CABLES

Running out of cable length can stop your build dead or make for nasty wiring. A set of USB 2.0, FireWire, and HD Audio cables from Apevia can get your build working in a jiffy.
$5, www.apevia.com

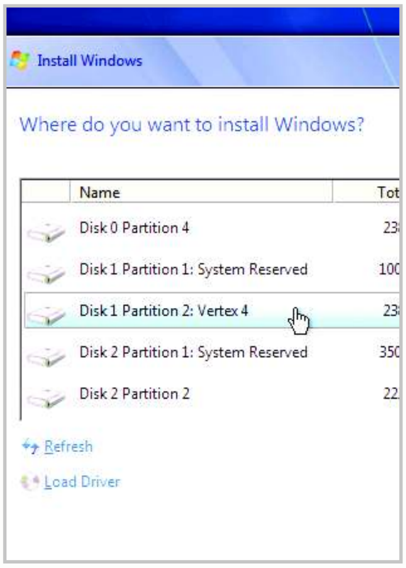
*Cont.* ➔

# TIPS FOR A SUCCESSFUL INSTALL

If you've successfully built a PC and it boots in one step, you're in great shape. But that's only half the battle. Now, you must install your OS to get it up and running. Here are a few handy tips to get your system going without issues.

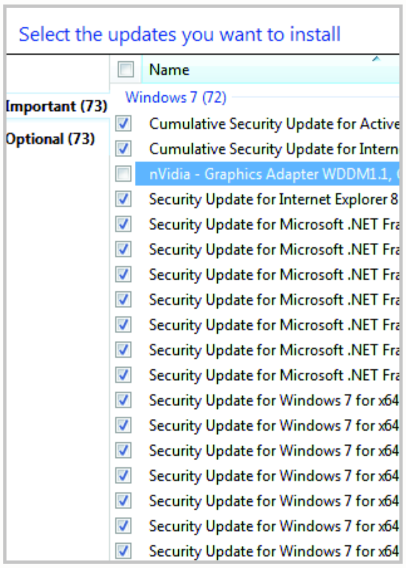
### TIP 1: DISCONNECT EXTRA DRIVES

If you're installing the OS on a machine with multiple drives, disconnect any secondary or tertiary drives from the system before installing the OS. Additional drives can, on occasion, "confuse" the Windows installer, and more importantly, if you have a second drive with data files on it, you're unlikely to accidentally wipe it out by installing the OS to the wrong drive.




### TIP 2: FOREGO THE WINDOWS UPDATE DRIVERS

Don't forget to install the latest drivers for your video card before you run Windows Update. If you update Windows first, it'll try to find drivers on its own, and they could either be Windows native drivers (which will suck for gaming) or an out-of-date version of the correct drivers.

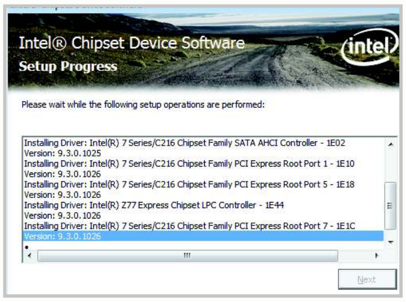



### TIP 3: DOWNLOAD THE LATEST DRIVERS

The motherboard DVD or CDs are usually pressed very early-on in the development of the product, so the drivers and software are likely to be immature. To get the freshest install, download the latest LAN drivers for your board and install them to get Internet access for your machine. Now, download the latest drivers from your motherboard maker's website.

### TIP 4: THE PROPER DRIVER ORDER

When installing drivers (besides the LAN driver to download the other latest drivers), our motto is an easy one to remember and follow: "Chipset drivers, then the rest."






### SATA-TO-MOLEX ADAPTER

One thing we hate is having to run an entire cable just to access a single 4-pin Molex adapter for internal accessories. The Frozen CPU SATA adapter lets you instead power Molex adapters from a SATA power connector. $6, www.frozencpu.com



### POWER EXTENSION CABLE

The ATX12V/EPS12V cable is one of the longest cable runs in the system and sometimes your PSU can't hack it. In those cases, an ATX12V/EPS12V cable gets the job done. $10, www.silverstone.com



### EXTERNAL-TO-INTERNAL USB 3.0

USB 3.0 pass-through cables are unsightly and rob your mobo of two rear USB 3.0 ports. Silverstone's External-to-Internal USB 3.0 Cable Adapter solves that by letting you route the pass-through ports to the internal motherboard header.
$12, www.silverstonetek.com

# TROUBLESHOOTING TIPS

There's nothing worse than flipping the power switch on a new PC and having absolutely nothing happen. Rather than running to the Internet to return all of the hardware you just bought, there's a certain order of business you should follow when she won't boot.

## CHECK YOUR POWER

On any DOA new build, start by first checking if the power switch for the front-panel connector is wired up correctly. If your motherboard has a built-in power switch, try that.




Now start looking at your power connectors. Check the Main Power Connector, the major power umbilical that plugs into your motherboard, to make sure it's firmly in place, as well as the ATX12V/EPS12V connector near the CPU socket. Also check the auxiliary power to the GPU. And of course, check the cables to the PSU as well as the PSU's power switch. Of course, you're sure your monitor is powered up and the video cable is in, right? If you're not sure if your PSU is even firing up, consider starting the unit using our short-circuit trick on page 25, with a single case fan hooked up to it.

## RESEAT

Once power is eliminated as a culprit, it's time to start checking the components. Turn off the PSU or just unplug it and begin reseating components. Start with the RAM, and then move to the GPU and other add-in cards. Pay particular attention to the RAM. First, make sure you have them installed in the right slots. Certain Intel CPUs won't fire up at all if the RAM is in the wrong slot. On the off chance you have bad RAM, try running just one DIMM at a time. Remember that when the PSU is hot, power is going to the RAM, CPU, and PCIe cards and there is always a remote chance of damaging the components if you muck with them with the power on, so switch it off.

## RESET THE CMOS

Cut the power to the system and then find the jumper on your motherboard, or use the external CMOS reset button on your system to reset the board's settings. If you can't find the CMOS reset, simply remove the coin-cell backup for 10 seconds and then replace it. If you're lucky, some unusual board state was causing the boot problem.

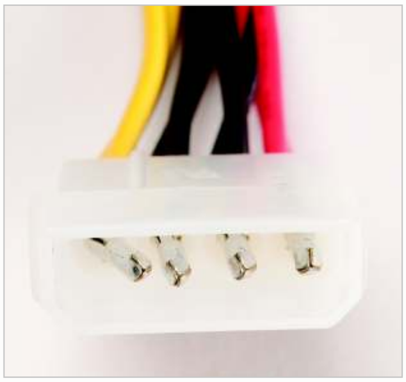
## CHECK THE POST CODE

If your machine starts to POST but hangs, look up the board's LED POST error in the manual to see if you can gauge where in the process the PC is hanging. If your machine doesn't have a POST code, try listening to the system's beep codes. This is a series of Morse Code–like short and long beeps that can tell where the hang-up is. If your board isn't making any beeps, it's possible you don't have an internal speaker hooked up, as many mobo makers leave these off for cost reasons. We actually keep handy a speaker that can be plugged into any motherboard. They're available online for about $5 and every builder should have one.




## PULL EXTRA PARTS

You've just finished the easy part of your troubleshooting. Now it's time to look at more serious matters. Pull all extraneous hardware from the system that you don't need, such as soundcard, and PCIe adapters other than the GPU, and unplug all of the drives from the motherboard and PSU as well as any extraneous items such as fan-bay adapters and lights. Four-pin Molex adapters are prone to shorting out if the pins aren't properly lined up when you plug them in. This can cause the system to fail to POST, as the PSU senses a short and shuts down. Again, you can try booting the box after you unplug each device if you want to isolate it. We usually unplug everything and if it boots, start plugging in each device until we can repro the problem.



## RESEAT THE CPU

At this point, you've exhausted all the low-hanging fruit. Now it's time to take more drastic measures. The first step is to pull the processor. A badly seated processor could prevent the system from booting. Once the CPU is out, grab your flashlight to look at the socket for bent pins. A botched CPU install can do this. If the socket is clean, replace the CPU and try booting the box again. If it's still dead, it's now time to pull the entire motherboard out of the system. It's possible you're grounding out the board against the case. You can try reseating the board or possibly booting the system using the CPU's integrated graphics chip. We don't recommend that you try to fire it up externally with a discrete GPU, as the unsupported video card could damage things even further.

## IT'S PROBABLY YOUR MOTHERBOARD

You're now nearly out of options, but if you can beg, borrow, or steal a CPU for you board, you can try a CPU swap on the off chance you have a dead chip. Be advised, the chances of getting an out-of-the-box dead processor are extremely rare. More likely, you have a bad motherboard—or perhaps a board that won't work with your CPU without a BIOS update. Still, if the board won't fire with a known good CPU, a piece of RAM, and nothing else hooked up to it, the board is probably to blame.

# THE EXPERT'S WINDOWS NET



HomeGroup is for newbs—you'll gain more flexibility and control over your networked sharing by mastering the nuts and bolts beneath the surface BY NEIL MOHR

# GUIDE TO WORKING

Networking has become one of the most essential elements of computing. Forget processors. Forget graphics cards. Forget memory. If you can't get networked at home and onto the Internet, we're pretty sure we know what your reaction will be. While you can live without 3D graphics and even a cutting-edge multicore processor, try living without your home network for half an hour and you'll run screaming into the night with the wail of "Wikipediaaaaaa" trailing after you.

We know you can string together your own home network. A wired network is sheer block-building child's play. A wireless network isn't much more strenuous, largely thanks to WPS reducing the complicated bit to little more than a button press or two. Or if you're like us, you've memorized your WPA key.

We're here to delve into the murky world of Windows networking and file sharing. We're not talking the HomeGroup system here; Microsoft has done a decent job of making that easy enough to use. We're going to explore the Windows NT networking system that underpins HomeGroup and indeed all of Windows file sharing. That's the key here—not only will this information arm you with the knowledge to twiddle with network shares on Windows 7, but without too many complications, everything from Windows NT and XP Server right through to Vista and Windows 8, too.

It's a reassuringly complex system, and once you understand the basic elements, it's easy to deploy with total control, allowing you to decide how, with whom, and exactly what is shared and accessible over your network. And let's not forget the ability to limit, monitor, and revoke access, too. Like we said, HomeGroup is fine if you're seeking basic control. For complete control, however, you want to unleash the full potential of Windows network file sharing.



## WITH KNOWLEDGE COMES POWER

So why, when Microsoft goes to all that time and trouble to provide an easy route with HomeGroup, should you care to learn the hard way? Frankly, because you'll gain far more flexibility for just a little more investment of your time. Besides, the more complex systems still work with the HomeGroup system. So you can pick and choose among them depending on how tiered you want to make your file-sharing access.

The truth is that the networking that exists inside all of Microsoft's current products is the same underlying system that was built into Windows NT back in 1993. As you might know, Windows NT became the core of Windows 2000, aka NT v5, and then Windows XP, as NT v5.1. The whole Windows range was effectively merged with Windows Vista as NT v6 and onwards. Technically, Windows 8, RT, and Server 2012 are all based on Windows NT v6.2.

This underlying architecture for Windows NT has remained the same, with security handled through the Security Reference Monitor system, using Access Control Lists and unique Security Identifiers called SIDs to orchestrate the symphony.

## HOME NUISANCE

Over the years, Microsoft has attempted to simplify the job of managing networked file shares, which, in our opinion, only helped to confuse the situation. We'll take advantage of some of these interface changes, since they offer shortcuts to sharing folders, but we're going to avoid HomeGroup.

HomeGroup is a streamlined way of getting file sharing to work over a home network. Similar to wireless networking WPS, it uses a PIN to prove valid authentication between systems. This is great if you can be bothered with a difficult-to-remember 10-digit PIN and having to change all those default folders so you don't share them with every Tom, Dick, and Harriet each time you initiate it.

It's not a bad system but it's still riding on the coattails of something that's more flexible. We also worry that it hands access to remote systems without any additional credential checking, which is to say once a PC is given access it always has access, no matter who's using it. So, if PC A used by Bob is given access to PC B, when little Timmy gets on PC A, Timmy's going to be able to access everything on PC B. It also doesn't help that networking issues are painful to diagnose, while the easy-to-use interface elements plug into the traditional networking regardless.

Part of this new system is the somewhat pointless Set Network Location selection. Get to it by selecting Start > Control Panel > Network and Internet > Network and Sharing, and under "View your active networks" select the current Home/Work/Public network link. The only reason to select Home network is that it enables HomeGroup, while Work network disables HomeGroup.

The Public network option is handy as it locks down network access to the system when on an untrusted network. Despite its semi-hidden nature, this does present a useful way of turning off the HomeGroup, though HomeGroup will remain in the Navigation pane till the sun engulfs the earth in its fiery embrace. Thanks, Microsoft.

## GROUP HUG

With that unpleasantness done away with, we can focus our attention on how the core Windows networked file sharing works. We're not starting at the beginning, as you were expecting. Instead we're going to look at Windows User Accounts. What on God's green earth has that got to do with networking? Well, Groups, Users, and Login sessions are core to the Windows security system. You're going to be able to enable remote access to systems on three levels.

The first is the Public shared folders that anyone can access. The next is Guest group access. This is for anyone who doesn't have a user account. Finally, there's User Account access, which requires that you enter credentials to access shared folders from a remote system.

This complex arrangement ultimately results in a highly flexible one; the small amount of initial user and group setup is easy enough to manage. It enables you to create groups that all have the same access privileges or provide personalized access to files and folders on an individual user basis. This also goes hand in hand with password protection and policy control over password usage.

On a basic level, users can be created and managed via the standard User Accounts Control Panel, and it's easy to enable the Guest Account access level here, too. However, we find that the best method is to do this via the Computer Management console. Access this by either typing **compmgmt.msc** into the Run dialog or right-clicking the Computer icon; then select Manage, and Local Users and Groups.

Notice the Shared Folders section that lives, handily, just above Local Users and Groups. As you create file and folder shares, these will become listed under the Shares section of this folder. This makes the Computer Management Console a good way to manage most aspects of networked file sharing from one place. Over time, if you're sharing a large number of folders, it can become confusing as to exactly what you've shared and with whom. The Shares section offers a list of everything shared, in one place and with all the controls you



**Dedicated network interface cards, such as the Killer NIC, are pretty much unnecessary.**

### TIP!

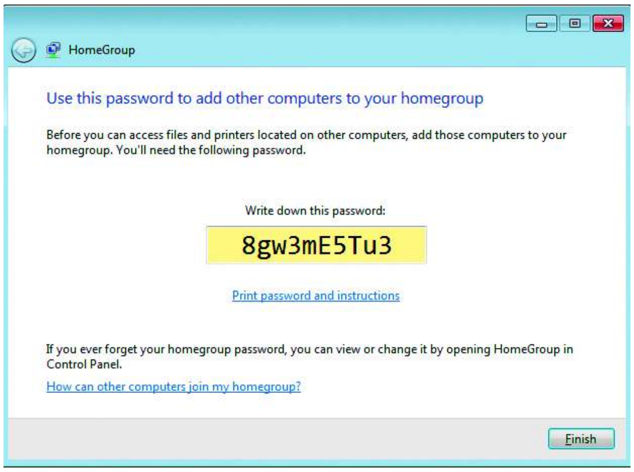
**Add the Network shortcut to your desktop by right-clicking a blank area, selecting Personalize, clicking the "Change desktop icons" link, and selecting Network. Do the same for the Start menu via the Properties section.**

need. Right-click the share you're interested in and you can immediately stop sharing, or choose Properties to adjust the sharing options.

The Users Properties dialog in the Shares section enables you to limit the number of users that can have active sessions. For the most part this won't be of interest to home users, but there are times when it could be useful, if bandwidth is an issue or you have a high number of users. The Share Permissions tab is also useful for easily changing the access permissions for groups and users. It's unlikely you'll need to delve into the Security tab, but this offers more detailed control over what users can do within shares.

## NETWORK NAMES

It's a minor point but worth covering, as it's certainly not obvious. When you're messing around with networking, the name of the PC you're working on is set via the Computer Properties. Right-click either the desktop icon or Start menu Computer entry, select Properties, and under the "Computer name..." section, click the Change Settings link. Click the Change button—why you can't just click this back in the Properties tab is beyond us—and change the computer name to whatever you want to view within the Network neighborhood (as it used to be called).




**HomeGroup requires a 10-digit pin every time that it's initiated for file sharing.**

You might also be wondering about the Workgroup name that can also be changed in here. Back in the days of Windows 3 and 95 this could be used to segregate PCs into groups, making it impossible for different Workgroups to share files or services. Today the Workgroup concept has been eliminated and is effectively useless. It's all a bit of a blur now, but back in those days NetBIOS took the major lead in network file sharing, with the additional Microsoft SMB protocol on top of this. From Windows 2000 onwards, the Microsoft SMB protocol did away with NetBIOS and thus the need for Workgroups.

Despite dumping NetBIOS to retain compatibility, the naming conventions for the Computer and Workgroup remain: a case-free name, without any spaces, no longer than 15 characters long with restrictions on special characters, which is to say almost no punctuation apart from a dash.

## NOT THAT ADVANCED

The most confusing aspect of Windows network file sharing is how to switch it to the correct mode, so that the PC is actually happy to accept password connections. This blazingly basic concept is buried in the "Change advanced sharing settings" section found in the left side panel of the Network and Sharing Center. The best way to access this is to right-click the Notification Network icon, select Open Network and Sharing Center, and click "Change advanced sharing settings." There's a list of very important options in here, many of which have to be set correctly for file sharing to work. Be aware that these options are duplicated over two separate sections in here. One section covers the Home/Work Network Location, and the other below this covers operating in a Public Network Location mode. The first two options—"Turn on network discovery," and "Turn on file and printer sharing"—we hope are self-evident. Both need to be selected for this to work well.

The "Public folder sharing" option is an interesting one. If

## TO THE CLOUD

An interesting possibility with shared folders is to combine them with Dropbox, Box, or a similar Internet-storage service. Ideally run with a home server, this provides a universal cloud system with files available to everyone at home, but also synchronized with any other devices that are running the storage service. Of course, this will be limited by the capacity of the service. Dropbox offers between 2GB and 18GB for free, Box offers 5GB, and Microsoft SkyDrive gives you 7GB. All of these can be expanded if you pay a monthly fee, and it provides an interesting, easy, and secure way to keep files available to everyone, everywhere.




Similarly, you can use a shared folder for backup and synchronizing. We recommend a cool program called Syncback from 2brightsparks.com. Fully functioning free and paid-for versions are available and it works in multiple ways. The first is a straight backup regime to copy modified files to a remote shared folder. The other function is synchronize mode, which keeps the files on your system and a remote folder in sync, thus enabling you to work locally on documents and have them automatically updated on a remote folder so others can access them, as well.

you want a simple way to easily share files to everyone, then this is a great option. The folder already exists within the [system drive]:\Users\Public folder. Be aware, this enables anyone connected to the same network to copy, move, and delete any files they choose within those public folders. This isn't the only way of providing simple password-free guest sharing, but it's a one-shot option you might be interested in.

We'll just briefly touch on the next two networking options: Media streaming is where you control the basic Windows Media Player and generic DLNA features. The File sharing connections option can be left at 128-bit encryption for better security. As far as we know, this should function correctly with almost everything.

The "Turn off password protected sharing" option is an important one. If you're happy to have anyone access shared folders marked with Guest access, then you can choose to turn this off. It's like public folder sharing but across the board for any folders you mark for Guest access. If you're happy to bare all to everyone on your home network, then this by far makes for the easiest file-sharing method. You still retain complete control over who can delete files on your server or computer by adjusting controls accordingly, or limit access completely by marking them only for registered users.

Finally, the HomeGroup connections option needs to be turned off here so we can control and create our own user permissions and shares. This part is a little confusing because, even when switched to off, all of the HomeGroup interface elements remain visible within Windows. In fact, it's almost like Microsoft adds this stuff without thinking about it.

The final element we'll mention here, as it's not obvious, is how to enable mixed-access of people with passwords—for secure items—and people you'd like to have Guest access without prompts or passwords. For example, we use a shared document folder that anyone can access without the need for a password, while backup folders require a password in order to keep files from being deleted or removed.

For this type of setup, you need to enable the Windows Guest account. There are two ways to do this: one is via the Start menu > Control Panel > User Accounts > Add or remove user accounts > Enable Guest Account. Technically, this can also be activated via the Users section of the Computer Management console. The Guest User is already created but you need to double-click it and clear the "Account is disabled" tick box. Once enabled, this, in conjunction with the "Turn off password-protected sharing," enables Guest access to folders marked with Guest access privileges.




**If you're sharing files from a server, powerline plugs are better than wireless.**

# CREATE GUEST SHARE ACCESS




### STEP 1: CREATE GUEST ACCOUNT

**First, make sure your shared system has a Guest account created and active. Select Control Panel > User accounts > Add or remove user accounts. The Guest account is shown here and it will be either active or off. You'll need to activate this before going any further.**




### STEP 2: GUEST ACCESS

**Right-click the Network icon in your system tray to check the basic sharing settings, select Open Network and Sharing Center, then click the "Change advanced sharing" settings. Public sharing can be left off but make sure that "Turn off password protected sharing" is selected.**




### STEP 3: ADD GUESTS

**Let's guest-share a folder. Create, for example, a Public folder, right-click this and select Share > Specific people.... This is the HomeGroup extended interface, so you can choose Everyone and click Add. Alternately, you can choose Guest from the drop-down.**

## SHARE AND SHARE ALIKE

With your system all set up, you're now ready to create password-protected users and enable open-access guest shares, alongside password-protected folder shares. You'll find instructions for doing just this in the walkthroughs, but the password-protected system requires the creation of a suitable user account with password.

The confusing element here is that the user account you create has to match the remote system's user account name; otherwise, you will find that the remote system will either be limited to Guest access or blocked entirely. This can create the odd situation where if you use the same account name on multiple computers, they will all have to connect to the network using this same user account.

To add even more confusion to the situation, once you've created the same user-named account, remote users don't have to log on with the same credentials. Instead, you can create a more memorable username and password that will still work for logging on to a remote share. This could, for example, be used when more than one person uses a computer with the same account. The additional credentials enables select people to access additional shares. We're sure there are other usage models that can be applied but that's the one that readily springs to mind.

Actually enabling the sharing of a folder or drive is a case of selecting the folder in question and using the HomeGroup share system, which is the Share with > Specific people… menu option. Here you can now add Guest and specific Users, then assign read/write permissions.

## DOING IT RIGHT

It's worth taking a little time to consider what you want to share over your network and how it can be segregated on your PC or server's storage. Shares can be nested, so you might password-

## REMOTE DESKTOP

If you've gone to the trouble of setting up remote User accounts, then it's not much more of a leap to give users remote-control of a PC via the Windows Remote Desktop RDP system. Under Users and Groups > Groups there is a Remote Desktop Users entry. By default, the main User account will have this access already, but you can add any other users to this group to provide them Remote Desktop access. To do this via the Computer Management console select Add > Advanced > Find and select the User.

You'll also need to enable Remote Desktop access to the system. The easiest way to do this is to right-click the Computer shortcut, select Properties, click Advanced System Settings > Remote tab, and make sure "Allow connections" is on. If you're connecting from Windows XP or non-Windows devices, you'll need to select the middle "any version" option.

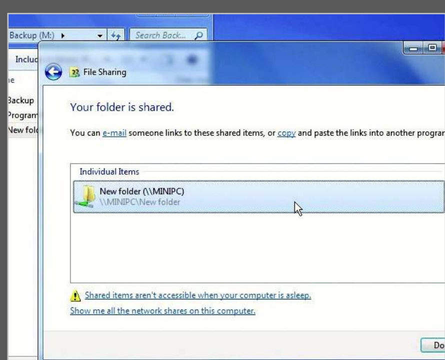






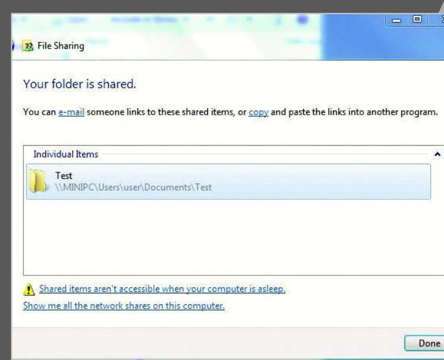
### STEP 4: ADJUST READ/WRITE

**When a user is added this way, you're able to adjust the level of access via the Permission Level column. Click the arrow next to the Read option and select Read/Write to enable Guest users to copy files into and out of the public folder.**




### STEP 5: AND SHARE

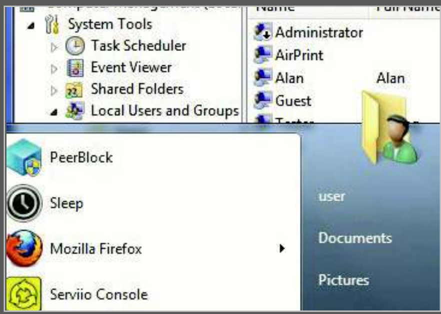
**With the Read-only or Read/Write setting selected, click Share and the folder is made available to everyone on the local network. The final window displays the Network path to the folder and offers a couple of basic ways to send this to other people.**

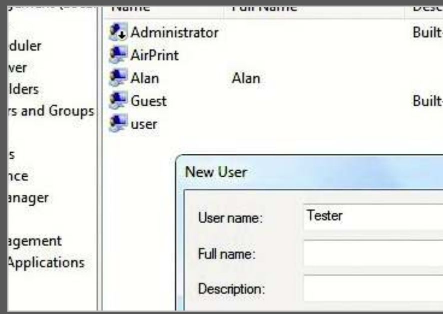


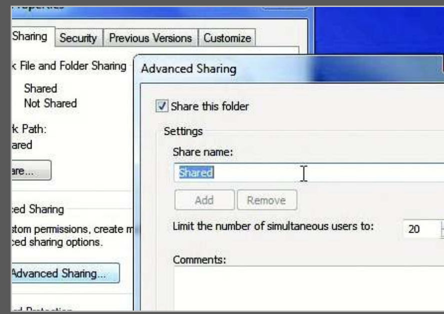

### STEP 6: LIMITED OPTIONS

**Using the built-in HomeGroup controls does make sharing easier, but the flipside is that it offers less control over how the shared folder is created. So if the folder already resides inside a share, it's not possible to create a separately listed shared folder.**

# ADVANCED SHARING




## STEP 1: CHECK YOUR USER

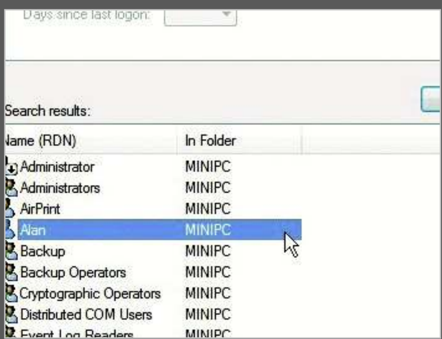
Before we create a user account, we need to check the remote user account name so they match. The easiest way is to open the Start Menu of that system and see the name in the top-right of the menu, or check the User list in the Management Console.

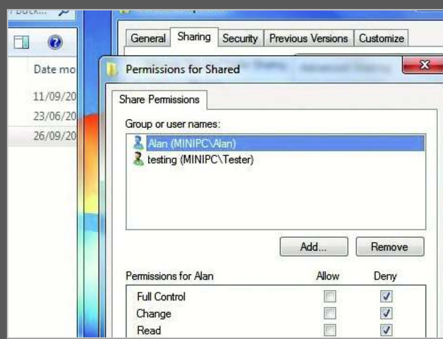
## STEP 2: USER ACCESS

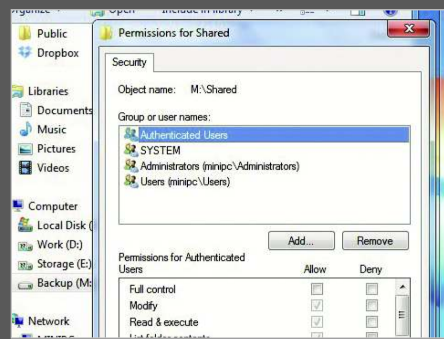
Armed with the correct User name, open the Computer Management console, go to Users, right-click a blank area and select New User… Add the name as the User name and choose a password. Click Create to add this new user to the system.

## STEP 3: COMPLEX SHARING

Create a folder on your drive. Right-click this, select Properties > Sharing tab > Advanced Sharing…, and click the "Share this folder" box. You're able to give this the name that appears within the Network folder and limit the maximum connected users.




## STEP 4: USERS AND GROUPS

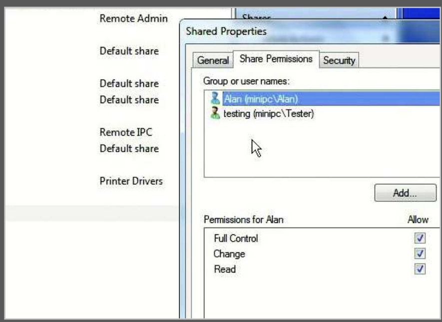
Click Permission and remove Everyone, as we don't want that. The next bit is stupid: click Add > Object Types…, deselect "Built-in security principles" and click OK. Go to Advanced > Find Now. A list of all the available Users and Groups will appear.

## STEP 5: ADJUST PERMISSIONS

Select as many users or groups as you want to have access to this share and click OK > OK. You can now adjust the read/write/delete permissions for the folder per user. We never quite understood why Deny exists, but perhaps it's to torment people?

## STEP 6: SECURITY ISSUES

Click OK followed by OK and the folder is now shared with the displayed path within the Network folder. The last thing to note here is the Security tab. This can seem confusing as it appears to duplicate permissions, but it deals with local access rather than network shares.










## STEP 7: COMPUTER MANAGEMENT

Right-click Computer in the Start menu and select Manage. Browse to Shared Folders > Shares and double-click the share you created, then click the Share Permissions tab. This will list the Groups and Users you added previously.

## STEP 8: CLOSING SESSIONS

Select the Sessions and Open Files sections and you'll see lists of the currently connected and active registered users or guests. Right-click a session and you can choose to close it down. Under Open Files, Spools are printer jobs queued for printing.

## STEP 9: REMOTE CONNECTING

All that's left to do is remotely log in from your newly registered system. You may need to log off and back on again if you've changed password or other details, but otherwise it's a case of entering the user name and password you selected.




**Setting up a wireless network has become little more than a few button presses.**

**TIP!**

**Once you have a share network, you can hang a printer off the PC and set it as shared via the Devices and Printers control panel. Right-click the printer, select Printer Properties, click the Sharing tab, and select Sharing.**

protect an entire documents folder, but then guest-share a single folder within that for public access—for example, to a photograph's folder.

Once in place, this old-school sharing is more straightforward than the contrived HomeGroup with its unnecessary pins and additional interfaces. Having said that, this does work best with a central server to which each networked PC does its sharing. In this case, it means just the one server has to be administered, though even this can be simplified by reusing a single account for access.

No matter what your approach, sharing files over your network will only make your life easier. Not only does it offer an easy way to share files everyone wants access to, but it opens up easy routes for backup, media streaming, and centralized mass storage that's machine-independent.

# TROUBLESHOOTING 101

Networking and problems seem to go hand in hand. If it's not an old router that needs resetting then it's some crazy setting you've failed to tick that's blocking a port. A major issue with Windows file sharing is that so many of the options are spread over so many different dialog boxes and different parts of Windows. If you find you're having problems connecting to a remote PC or getting access to a share, then let's go through the areas that can cause issues.

It's always worth checking the physical aspects. During the writing of this story, for instance, we couldn't access the server because it had powered down. Similarly, check routers, connections, and, if you can, connect to the Internet for general network function. Usually, the PC's name should show up in the Network folder almost instantly.

If the physical side is good but the PC's name isn't showing up in the Network folder, you'll usually find that a fairly basic issue is at fault. Check the "advanced sharing settings" within the Network and Sharing Center, and verify that network discovery and file sharing are both on. If they are, you might also want to check that File and Print Sharing are enabled in your firewall. The Windows Firewall can seem crazily complex, but check that the Private profile and (SMB-In/Out) is enabled.

If you're sure everything is connected, functioning correctly, basic settings are set, and Firewalls have the correct ports open, let's delve into the common issues for refusing a share. The most common annoyance is Windows firing up a dialog stating access cannot be established, with an option to diagnose the problem. This can happen in a number of circumstances, and usually involves how you're accessing the remote share.

The first scenario is someone just trying to connect to a PC as a guest. The two big reasons for error are that either the Guest User account hasn't been created or is disabled. The other is that "Turn on password protected sharing" is selected, so only registered users can connect. Additionally, if you're using Public folders, check this option and make sure the HomeGroup connection is correctly selected.

The second common scenario is when a registered user cannot access a system. This will likely be due to the account names not matching correctly, or the account being disabled on the remote system. Similarly, if a registered user can't access a share but can get on the system, then it's most likely that the account hasn't been added to the permission list.





unknown VIRU
alert



# YOUR ANTIVIRUS, TESTED

## IN A TWIST ON OUR ANNUAL AV ROUNDUP, WE LET *YOU*, THE READERS, PICK THE 10 CONTENDERS FOR THE 'ULTIMATE PROTECTOR' CROWN

**BY PAUL LILLY**

Every year, antivirus vendors paint the same gloom-and-doom portrait, their canvases filled with startling statistics outlining the rapid spread of malware. As a consumer, the natural reaction is to look at these reports with a fistful of salt and a sack of skepticism—after all, AV vendors have a vested interest in promoting a need for security software, but are we really as vulnerable as they say? It all depends on your computing habits, but make no mistake, the web is a dangerous place to roam.

We've seen firsthand what a malware-infected PC looks like; it isn't pretty. Today's malware strains not only slow down your PC and bombard you with pop-ups, they can also capture your keystrokes and send your bank login information to a cybercriminal thousands of miles away. An innocent mouse click on the wrong URL is all it takes to set the wheels in motion, and the next thing you know, someone else is using your identity to open up a credit card account. Not cool.

Careful computing is your best line of defense, but sometimes it's not enough. Security software adds another layer of protection, which is why we run an antivirus roundup each year. This time around, however, we asked *you* to vote on which 10 programs should make the cut, and you'll find the results on the following pages. If the one you voted for isn't represented here, let us know and we'll consider running a stand-alone review in a future issue.

# EVALUATING AV

## WHAT MATTERS IN AN ANTIVIRUS PROGRAM AND WHY

### SYSTEM PERFORMANCE AND SCAN SPEED

We're passionate about our PCs, and we don't spend endless hours researching parts and tweaking settings only to watch a security program rob us of the performance we so carefully crafted. To keep these programs honest, we compare how long it takes to boot into Windows versus a clean install. We also examine the impact on PCMark 7 and Vantage scores, and how long it takes to transfer 6GB of data. Finally, we measure the time it takes to run a first and subsequent system scan.

### ANNOYANCE

We know what we want when it comes to security software, but do the developers know? We deduct points for programs that try to upsell us additional security or that are hyperactive with unnecessary security alerts. At no time should we have reason to be annoyed or frustrated with an AV program. Period.

### FEATURES AND IMPLEMENTATION

Most of the programs voted into this roundup are Internet security suites that promise to go above and beyond simple virus protection. In theory, these suites should include everything we need to stay safe on the web, and everything else is icing on the cake. At the same time, we don't want to be bogged down with arbitrary add-ons that exist solely to beef up an AV's resume. We're looking for useful additions, and also how well they're integrated into the core package. Extra points are awarded to AV programs that inform you when you need to update an app, plugin, or browser.

### PRICING

Let's get one thing straight: You don't need to pay for protection. If that's the case, why bother reviewing non-free security suites? Put simply, we believe there's value in security programs that bundle multiple layers of protection and features into a tidy package. However, the ones that charge an annual fee have to convince us that they're worth paying for, unlike the free AV programs, which get an automatic pass in this category.

### VIRUS DETECTION

If you think this category should hold the most weight, we're right there with you. Pricing and features don't mean diddly-squat if an AV program turns a blind eye to malware. This is also the trickiest category to judge. Our approach is multipronged and starts with synthetic spyware and virus tests found on www.spycar.org and www.eircar.org. Next, we consult with independent testing labs Virus Bulletin (www.virusbtn.com), AV-Comparatives (www.av-comparatives.org), and AV-Test (www.av-test.org). Finally, we subject each program to our own collection of malware and dirty links.

# BITDEFENDER

## TOTAL SECURITY 2013

Quiet as a mouse, lethal as a lion

**FAR AND AWAY** our favorite feature of BitDefender is its Autopilot mode, which ought to be called "Shut Up and Leave Me Alone" mode. When engaged, BitDefender's autopilot steps in as if to say, "I've got this, you just go about your business," and as you do whatever it is you do on your PC, any and all security-related decisions that need to be made are handled silently in the background.

This feature alone is a godsend if you're the designated IT guy for friends and family members—no more late-night calls about security pop-ups or, even worse, messed up machines because your mother-in-law granted permission to a dirty download even though a security warning advised against it. D'oh!

It also requires a fair amount of trust, which BitDefender earned as we did our best to break down its defenses. There wasn't much that BitDefender didn't recognize right off the bat as malicious, and the few dirty downloads it didn't immediately identify were thwarted by its cloud-based definitions. Malware stands little chance, though it comes at a small cost.

There's the price of the security suite itself, but you'll also pay in performance. Our 6GB file transfer test took 11 seconds longer to perform with BitDefender installed, which translates into roughly a 10 percent performance hit. Both PCMark scores suffered slightly, though oddly enough, there was no increase in boot time. Scanning was also a mixed bag, with an initial sweep taking over half an hour, but reducing to less than four minutes during subsequent runs.

The performance hiccups aren't enough to sour us on BitDefender. It offers a tough veil of protection that's unobtrusive, and value-added features like a virtual keyboard for shopping sites, online storage, and a vulnerability scan that detects out-of-date software add to the overall package.



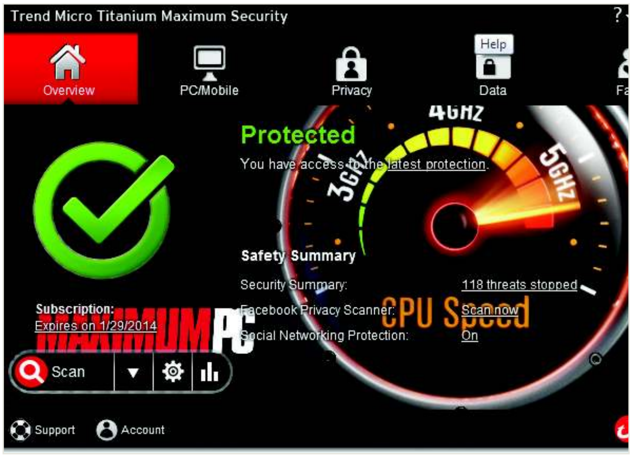

**BitDefender replaced scheduled scans with an Auto Scan driver that hunts for viruses when resources are available.**

VERDICT 9 KICK ASS!

**BitDefender Total Security 2013**

$80 (3 PCs, 1 Year), www.bitdefender.com

# TREND MICRO
## MAXIMUM SECURITY
Security for social-networking butterflies




**You can customize Trend Micro's user interface by uploading a photo of your own or selecting from a handful of preloaded images.**

**IT'S BEEN THREE** long years since we last reviewed Trend Micro, having exiled the program from our annual AV roundups for its particularly poor showing back then. We don't hold grudges, however, and apparently neither do the *Maximum PC* readers who voted Trend Micro into this year's AV cage match. Have things changed since then?

They most certainly have. Whereas the old Trend Micro cowered in the corner when we unleashed a flurry of malware, the latest version threw itself in harm's way and made sure nothing outwardly awful infiltrated our test bed. Malware was able to sneak in by hiding in zip files, but they were quickly beheaded as soon as they stuck out their necks. As an extra precaution, we recommend enabling real-time scanning of compressed files, an option that's not checked by default.

Independent testing labs generally gave Trend Micro high scores, so between their tests and ours we're much more confident in TM's ability to hold the fort when danger comes knocking. It's also a good choice if you spend a lot of time on social networks. Trend Micro expanded the number of social networks it scans for dangerous links to now include Google+, LinkedIn, Pinterest, and Sina Weibo, in addition to Facebook, Twitter, and Mixi. There's also a "Privacy Scanner" for Facebook that analyzes your settings and makes recommendations.

Not all is roses and rainbows, however. Trend Micro's active scanner had the biggest negative impact on our file-transfer test, which took nearly 50 percent longer versus a clean install. We're also disappointed Trend Micro doesn't offer more fine-grain control over its settings. Part of the reason is because there's no built-in firewall, just a "firewall booster" feature that aides the Windows firewall. Overall, Trend Micro is leaps and bounds better than three years ago, but there's still room for improvement.

**VERDICT 7**

**Trend Micro Maximum Security**

$90 (3 PCs, 1 Year), www.trendmicro.com

# MCAFEE
## INTERNET SECURITY 2013
No longer the performance hog it once was

**FOR BETTER OR** worse, reputations are hard to shed, and some folks still view McAfee as a gas-guzzling dump truck parked out on the front lawn, oftentimes uninvited. OEMs like to bundle McAfee with other trialware on new systems, a two-way relationship that also benefits McAfee, albeit at the expense of street cred. And then there's the recent drama surrounding company co-founder John McAfee, who faked a heart attack to evade Belizean authorities (it's a long, bizarre story that's worth a Google search).

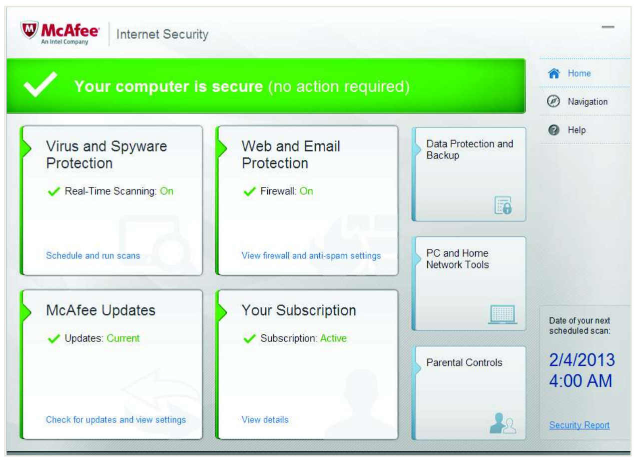
None of that really matters as far as we're concerned, because the reality of how a product performs far outweighs the perception of the masses. So, how did McAfee perform? Like a roller coaster with several ups and a few downs.

This year's build is redesigned with a touch-friendly tiled interface that's obviously geared toward Windows 8 users, though it functions just fine with a mouse and keyboard and on Windows. All the main functions sit front and center, and it doesn't take much effort to dig beneath the surface to where the advanced controls are located.

When surfing shady websites, McAfee did a good job blocking most malicious downloads, though it did let a few dirty files reach the desktop. Most that touched ground were quickly put under lock and key, but a few slipped through, including a file identified as a keygen by Malwarebytes.

System performance was another mixed bag. McAfee didn't affect our test bed's boot time, nor did it bog down our PCMark 7 benchmark run. PCMark Vantage, on the other hand, scored 1,700 points lower. Subjectively, the system didn't feel sluggish with McAfee installed, which hasn't always been the case.

We can't say whether power users are ready to forgive McAfee for past sins, but as it stands, it's an above-average scanner filled with features.




**McAfee's redesigned interface will especially appeal to users with touchscreen displays.**

**VERDICT 7**

**McAfee Internet Security 2013**

$80 (3 PCs, 1 Year), http://home.mcafee.com

# ESET
## SMART SECURITY 6

Old dog in security learned some new tricks

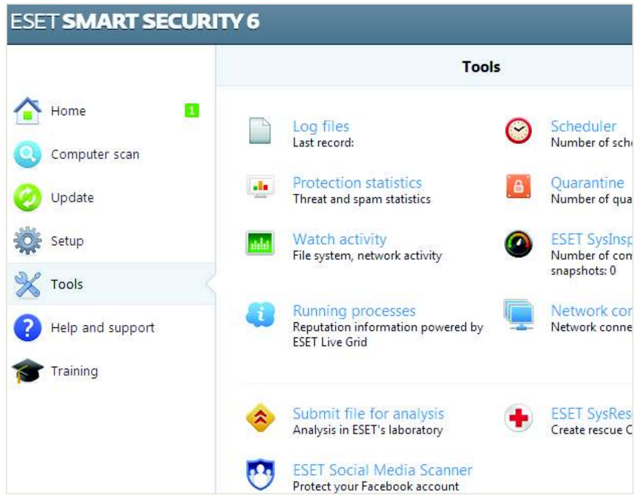
**ESET SMART SECURITY 6'S DASHBOARD** is largely unchanged from versions 4 and 5 in appearance. It consists of a main window with a handful of navigational prompts in the left-hand pane including Home, Computer scan, Update, Setup, Tools, Help and support, and Training. The main window changes as you click through each one but the left-hand pane never does, making navigation a breeze. If you find yourself knee-deep in an advanced setting and want to hightail it out of there, just click on Home or any of the other headings.

There's nothing flashy about ESET's interface. It hasn't been modernized for Windows 8 or touchscreen displays, or for 2013 in general, and you can't customize the layout or upload your own background image à la Trend Micro. Dig beneath the surface, however, and you'll uncover a gold mine of options. In the Setup screen, for example, there are headings for Computer, Network, Web and email, and Parental control, and each of those have their own subheadings that you can, at minimum, enable or disable. In addition to all that, there's an advanced setup screen accessible via a link at the bottom of the window. Less-savvy users will find the sheer depth of settings overwhelming, and even advanced users might lose track of everything they tweaked. If you're setting up ESET for multiple clients, you can export and import configurations to save time.

We dinged the program last year for letting a few nasty containments through, a rare misstep for a program that's collected a dozen straight VB100 awards from Virus Bulletin in the past two years. It fared much better in our tests this time around.

Bundled with the latest version is a Social Media Scanner that combs your Facebook profile for infected content. It's also available as a free download, so that alone isn't enough to tip the scales in ESET's favor. There are plenty of other tools, however, such as parental controls and, new to this release, anti-theft features that can help you locate a lost or stolen mobile device. If someone swipes your laptop, you can engage the webcam, track its location, or initiate a Phantom Account so that your real account—and all your personal data—is hidden from the thief. You can even send a message, such as "Reward if found."

A slow on-demand scanner and an aging interface are all that prevent ESET from earning a Kick Ass award.




**ESET's interface is unchanged from the previous two versions, but there are some new features, such as Social Media Scanner and a suite of anti-theft tools.**

**VERDICT 9**

| **ESET Smart Security 6** |
|---|
| $60 (1 PC, 1 Year), www.eset.com |

# SECOND AND THIRD OPINIONS

No single product is all-knowing when it comes to malware, which is always evolving, so it's a good idea to solicit a second or even third opinion on occasion. We recommend running an on-demand scanner around once a month, and also any time you have reason to believe something may have slipped past your AV software. Does your system suddenly feel sluggish? Are your web searches getting hijacked? These are both indicators that a foul file has infiltrated your PC.

One of our favorite on-demand scanners is Malwarebytes (free, www.malwarebytes.org). Not only is Malwarebytes adept at uncovering pesky programs that manage to hide from your AV scanner, but it also has a way of running even when malicious programs specifically try to prevent it from firing up. Just head to Start > All Programs > Malwarebytes Anti-Malware > Tools and click the Malwarebytes Anti-Malware Chameleon icon.

Another program we recommend adding to your toolbox is Comodo Cleaning Essentials (free, www.comodo.com), which allows you to terminate, delete, or suspend any untrusted item with a single mouse click. It doesn't require installation, making it a handy program to tote around on a USB stick.

If an infection is preventing your AV scanner from running, don't panic. Yet another option is web scanning. There are lots to choose from, including Panda ActiveScan (free, http://bit.ly/2T0ite). Alternately, if all you need is a background check on a single file, upload it to VirusTotal (free, www.virustotal.com), which will check it against dozens of AV scan engines.

# KASPERSKY
## INTERNET SECURITY 2013
When more of the same isn't necessarily a bad thing




**If you're familiar with last year's build, you'll feel right at home in KIS 2013.**

**LAST YEAR'S** overhaul gave birth to an interface designed for touch, a theme that's been carried over to the 2013 release, which is a near carbon copy. In fact, our entire experience with KIS 2013 gave us a serious sense of déjà vu.

Familiarity kicked in when we were once again duped by what at first appeared to be a subsonic installation routine, only to find ourselves mired in an unusually long update process that took north of 10 minutes on a high-speed connection. Subsequent definition updates zip through cyberspace at a much faster pace.

Also like previous versions, Kaspersky's scan engine sprints to the finish line, especially after performing an initial sweep. Our first full scan took 14 minutes and 26 seconds, and a second scan shaved 13 minutes off that time by skipping over files that hadn't changed.

The similarities continue. Once again, Kaspersky watched us download several contaminated files to the desktop before springing into action, whereas some of the other AV programs would cut off the same downloads before they could finish. To its credit, Kaspersky neutralized almost every threat and its track record among independent testing laboratories is very good; it even earned a Product of the Year award from AV-Comparatives.

Brand-new to KIS 2013 is a feature called Safe Run that's designed to protect your online banking sessions. Safe Run detects when you navigate to a popular payment service like PayPal or a banking website and opens up a protected browser to isolate your transaction. You can also use a virtual keyboard as an additional layer of protection (from keyloggers).

While the Safe Run feature is unique, Kaspersky hasn't yet jumped on the social-media bandwagon like some of the other programs. Still, it's a fleshed-out and polished security solution that's tough on malware.

**VERDICT 8**

**Kaspersky Internet Security 2013**

$80 (3 PCs, 1 Year), www.kaspersky.com

# ZONEALARM
## INTERNET SECURITY 2013
Why buy the security suite when the protection's free?

**BEFORE WINDOWS** got its act together, it was imperative to download a third-party firewall to keep the bad guys at bay, and ZoneAlarm was often at the top of the list. The firewall in Windows is much improved these days, and if you're sitting behind a router, you're further protected against malicious inbound traffic. Does that render ZoneAlarm obsolete?

Not as far as we're concerned. Like the ones included in other advanced security suites, ZoneAlarm's firewall offers more sophisticated protection and is able to sniff out mischievous code trying to sneak its way in (or out) by masquerading as a legitimate program. We also give ZoneAlarm credit for hushing its firewall, which is much better about making security-minded decisions in the background rather than bombarding the user with pop-ups.

Here's the thing: Even if all you have is a ball of lint in your pocket, you can afford ZoneAlarm's free antivirus + firewall combination, which has many of the same features as the $80 suite reviewed here. Should you decide to plunge into paid territory, the only extras are 24/7 technical support, parental controls, spam controls, and automatic hourly signature updates.

Let's backtrack a moment and talk about AV performance. ZoneAlarm wouldn't tell us which company it licenses its scan engine from, though we believe it's still Kaspersky, which the company confirmed several years ago. The initial definition update was just as pokey as Kaspersky, and we also noticed similarities in how downloads are able to reach the desktop before they're neutralized. Scanning our test bed was nearly as quick, too.

ZoneAlarm also includes identity protection, Facebook privacy scanning, advanced do-not-track controls, and 5GB of online backup. It's a well-rounded feature-set, and it's all available in the free version, too. There's just not enough added value to recommend the paid suite.




**If ZoneAlarm detects an issue, the corresponding module in the dashboard will turn red.**

**VERDICT 7**

**ZoneAlarm Internet Security 2013**

$80 (3 PCs, 1 Year), www.zonealarm.com

# NORTON
## INTERNET SECURITY
Big-time protection with a small footprint

**FIRST THINGS FIRST**—last year, we said that if Symantec ever removes Norton's real-time (and real hokey) Threat Map from the UI, we won't have anything left to piss and moan about. Well, guess what? Symantec finally got rid of the useless Threat Map, which displayed hotspots of AV activity around the world, and wouldn't you know it, we're fresh out of complaints.

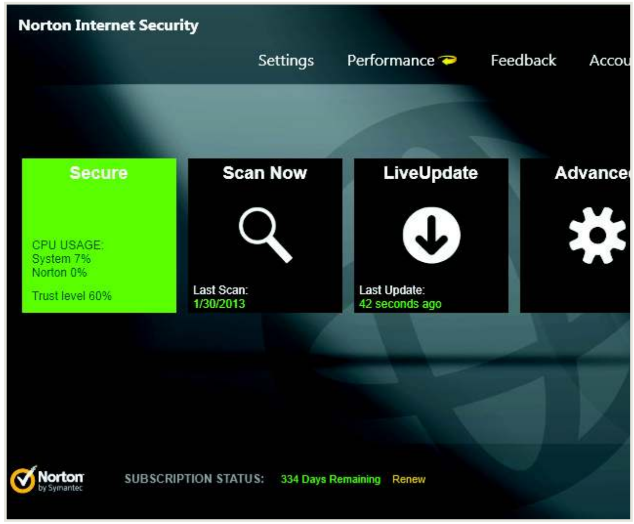
That doesn't mean we can't nitpick. At nearly 24-and-a-half minutes for an initial sweep of our test bed and a little over 10 minutes for a subsequent scan, Norton finds itself a few car lengths behind pole position in this roundup. And as long as we're picking nits, we're a bit disappointed Norton still hasn't adopted a virtual keyboard as an added layer of protection against keyloggers, which would come in handy when signing into banking sites. Oh, and it's not free.

Big whoop—our manufactured reprimands notwithstanding, Norton Internet Security (NIS) is the total package. Notice we left out the year from the product name. That's because Symantec dropped the annual label and has promised to push out new product and feature updates throughout the year so that you always have the latest version, so long as your subscription is current.

On the surface, NIS looks similar to last year's release, minus the Threat Map and with larger tiles on the main screen. Between automatic background scans and pulse updates that are doled out every five to 15 minutes, there's really no reason to bring up the interface, unless you want to check how many days are remaining on your subscription or need to adjust advanced settings. In case of the latter, Norton allows you to dig as deep as you want to go.

Symantec is constantly improving its SONAR technology, which analyzes how programs behave to determine if they pose a threat. It also takes into account how old a file is and how many other Norton users have downloaded it. This can be problematic for inexperienced developers learning the ropes of clean code, though SONAR is easily disabled. In most cases, we recommend leaving it on and letting it zap potential threats.

Speaking of which, NIS pounces on poisonous downloads like a fumbled football. That is, if it doesn't block the offending site first. On top of it all, Norton had the least impact on system performance out of all the paid suites.




**In addition to virus scans, Norton will analyze your Facebook wall and check the trust level of programs running on your system.**

VERDICT 10 KICK ASS!

**Norton Internet Security**

$80 (3 PCs, 1 Year), www.norton.com

## AV DOES NOT MEAN IMMUNITY

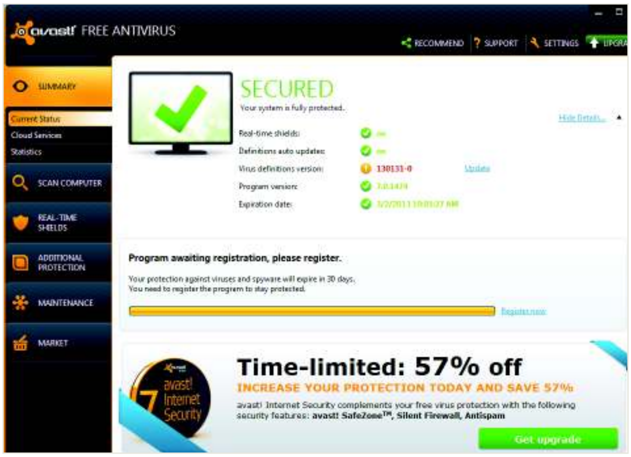
Just because you have antivirus software installed doesn't mean you can roll around the web with impunity. New and emerging threats, also called "zero-day" attacks, are those that are so recent that software developers haven't had a chance to plug up the vulnerability they're trying to exploit. The same holds true for your AV software—until there's a definition update, zero-day threats have a free pass to run amok. That's why behavior-based scanning is so popular, but even the best-rated apps sometimes fall short in this area. It's all the more reason to be vigilant, but how?

Well, your best line of defense is to practice smart computing habits and avoid putting yourself in high-risk situations. Pirating software is one the quickest ways to contract a digital disease, but it's far from the only one. Venturing over to seedier sides of the web—the URLs that only get typed into incognito browser sessions—is another hotspot for malware (excuse the pun).

None of this means you need to be a nervous Nelly when surfing the web. There are things you can do to tip the scales in your favor, like making sure your operating system and browsers are all up to date and fully patched. The same holds true for plugins, especially Flash and JavaScript.

As an added layer of protection, consider surfing with Sandboxie (free, www.sandboxie.com), which wraps a virtual layer around your browser so that any changes programs make while surfing the web are isolated from the OS.

# AVAST
## FREE ANTIVIRUS VERSION 7
Pro-level protection that's pro bono




**At first, Avast is almost relentless in trying to get freeloaders to upgrade, but over time, its solicitations calm down considerably.**

**FOR SOME,** a paid security suite is a luxury that just doesn't fit within the budget. Luckily, there are programs like Avast you can enlist as your PC's personal bodyguard for nothing in return.

Well, that's not entirely true. Avast requires a modicum of system resources to work its mojo, and though it's free to install, Avast frequently tries to sway you into purchasing additional protection. It starts during the installation scheme, and again you're encouraged to upgrade to a paid package when you fill out the registration form, which you have to do within 30 days for it to continue working. On top of it all, there's a persistent banner ad integrated into Avast's main menu.

Should you remain steadfast in your conviction to save your money, you won't be the worse for wear since the free version takes security just as seriously as its paid brethren. The level of fine-grain control is almost dizzying, and one setting we recommend checking right off the bat is to scan for potentially unwanted programs (PUPs).

Avast usually scores high marks from independent testing labs, and we can see why. It's very good at sniffing out hidden dangers, and when we were finished stepping on virtual landmines, Avast mitigated the damage, leaving just a few harmless remnants behind. Only Norton blocked more malware.

Avast automatically shoves suspicious programs into a sandbox, thereby isolating them from the OS. Unfortunately, you can't invoke the sandbox at will, nor will you find a firewall or antispam controls, features that are reserved for the Pro version.

Unique to Avast is a remote assistance tool. If you (or your parents) run into a jam, you can share a special code with another Avast user to open up a remote support session similar to programs like LogMeIn—nifty!

**VERDICT 8**

**Avast Free Antivirus Version 7**

Free, www.avast.com

# MICROSOFT
## SECURITY ESSENTIALS 4.1
Decent option for low-risk users

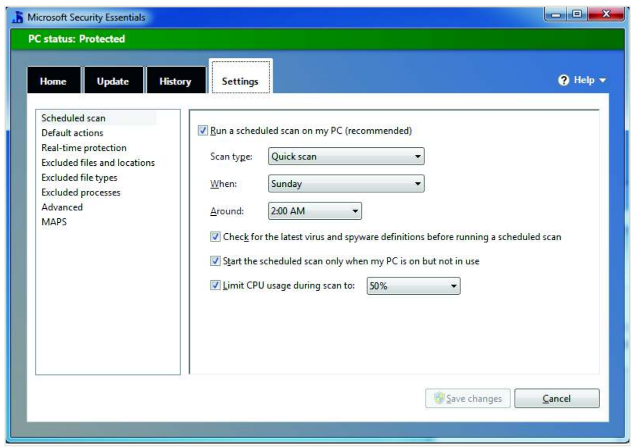
**MOVE ALONG,** Windows 8 users, there's nothing for you to see here. Windows 8 already has its own built-in antivirus solution called Windows Defender, which acts more like MSE than like Windows Defender on older versions of Windows, Microsoft claims.

If you're rocking Windows 7 or earlier, MSE offers more robust protection than Windows Defender, and it's free to boot. But it's also somewhat limited in scope compared to its freebie competitors. There are just a handful of settings to play with, such as enabling/disabling real-time protection and setting up file-type exclusions. You can also schedule an automatic scan and (optionally) allocate CPU usage from 10-100 percent in 10 percent increments (50 percent is the default setting). Beyond those controls, micromanagers will quickly grow bored.

MSE wielded one of the lowest system footprints of all the antivirus solutions we tested. It had virtually no impact on PCMark and only added a few seconds to our 6GB file transfer test. That's impressive, but lest Microsoft pull a muscle patting itself on the back, MSE's scan engine ran abysmally slow in our tests. It took over an hour to sweep our hard drive, more than twice as long as the next-slowest contender, and even a subsequent scan took a comparatively lengthy 25 minutes to complete.

So the scan engine is slow, but is it methodical? That's a bit harder to assess. MSE was recently criticized for failing to receive certification from AV-Test.org, though Microsoft contends that 0.0033 percent of MSE users "were impacted by malware samples not detected during the test." Other labs rate MSE favorably, though in our own tests, MSE was average, blocking most dirty downloads but also letting a few malicious programs write to the registry.

MSE passes muster for low-risk users, but there are better AV solutions.




**Once you initiate a scan, you either have to let it complete the run or cancel the process; there's no pause button.**

**VERDICT 6**

**Microsoft Security Essentials 4.1**

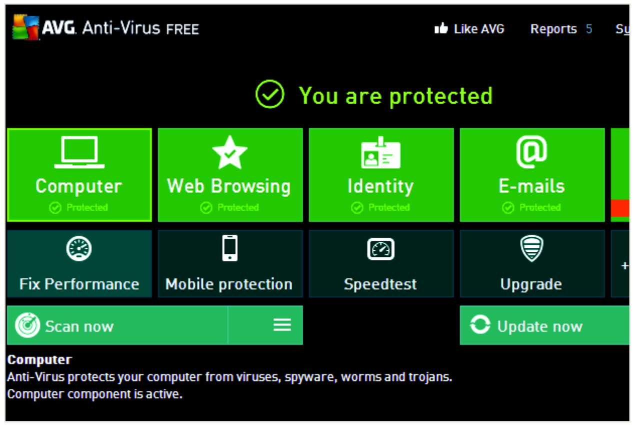
Free, www.microsoft.com

# AVG
## ANTIVIRUS FREE 2013
An old favorite now faces stiff competition

**YOU KNOW THAT** long-distance friend of yours who looks drastically different every time you meet up? If he were an antivirus program, he'd be AVG, which once again is sporting a new style. This latest version is clearly influenced by Windows 8, though the tiled interface only runs skin-deep. Once you click (or touch) through to the advanced settings, the tiles disappear and a new two-pane window pops up with categories on the left-hand side and checkboxes shoveled to the right.

There are plenty of options to keep you busy, and like last year's release, you can upload custom sounds and attach them to specific events. One thing we found annoying is that a few of the settings are ploys to upsell AVG's paid security software, and it's not always clear at first glance. For example, one of the main tiles reads Fix Performance, yet there's nothing to indicate it's not included in the free version until after it's finished analyzing your system for registry errors and other potentially performance-hobbling cruft.

For anyone paranoid about privacy, the Do Not Track feature integrated into AVG's browser toolbar tattles on websites and advertisers trying to collect data about your online activity. It works with IE, Chrome, and Firefox. There's also an Identity Alert feature (not to be confused with Identity Protection, which AVG uses to describe behavior-based scanning), but that's another paid extra.




**AVG's interface is a little cluttered, in part because it lists modules that are only part of the paid security suite.**

Large file transfers are noticeably slower with AVG installed, though not much else gets bogged down. Scan times were among the fastest, and though we were able to overwhelm AVG's defenses with dirty downloads, it defused most of the payloads, and was especially adept at blocking browser exploits.

Out of the three free AV contenders, Avast offers the best balance of performance and features; AVG is a close second.

VERDICT 7

**AVG Antivirus Free 2013**

Free, http://free.avg.com

### AV FEATURES

| | BitDefender | Trend Micro | McAfee | ESET | Kaspersky | ZoneAlarm | Norton | Avast | MSE | AVG |
|---|---|---|---|---|---|---|---|---|---|---|
| Email Scanning | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| IM Scanning | Y | Y | Y | N | Y | Y | Y | Y | N | N |
| Spyware Protection | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Facebook Scanning | Y | Y | Y | Y | N | Y | Y | N | N | N |
| Heuristics | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Firewall | Y | N | Y | Y | Y | Y | Y | N | N | N |
| Spam Controls | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Parental Controls | Y | Y | Y | Y | Y | Y | Y | N | N | N |
| Windows 8 Compatible | Y | Y | Y | Y | Y | Y | Y | Y | N | Y |

### AV PERFORMANCE

| | BitDefender | Trend Micro | McAfee | ESET | Kaspersky | ZoneAlarm | Norton | Avast | MSE | AVG |
|---|---|---|---|---|---|---|---|---|---|---|
| Scan 1 (min:sec) | 35:10 | 3:46 | 25:00 | 30:44 | 14:26 | 18:15 | 24:28 | 20:41 | 61:50 | 18:39 |
| Scan 2 (min:sec) | 9:15 | 0:26 | 15:25 | 29:25 | 1:26 | 3:33 | 10:12 | 16:43 | 25:00 | 1:51 |
| PCMark 7 | 2,955 | 2,966 | 2,977 | 3,008 | 2,961 | 3,004 | 3,036 | 2,991 | 3,043 | 3,003 |
| PCMark Vantage | 8647 | 8,504 | 7,747 | 9,017 | 8,608 | 8,753 | 9,151 | 8,595 | 9,007 | 8,824 |
| Boot (sec) | +35 | +55 | +7 | +14 | +56 | +18 | +0 | +33 | +20 | +53 |
| 6GB Fire Transfer (sec) | +11 | +35 | +12 | +5 | +18 | +49 | +1 | +6 | +7 | +19 |

Our test bed is an Intel Core i7 930, Asus P6X58D Premium, 4GB Corsair DDR3/1333, a Radeon HD 5850, a Western Digital Caviar Black 1TB 7,200rpm, and Windows 7 Professional.

iFixit presents:

# AUTOPSY

THIS MONTH WE DISSECT...

# GoPro Hero3




## About iFixit

iFixit is a global community of tinkerers dedicated to helping people fix things through free online repair manuals and teardowns. iFixit believes that everyone has the right to maintain and repair their own products. To learn more, visit www.ifixit.com.



## BACKGROUND:

The compact, hands-free GoPro has become *the* go-to camera for adventurers who want to capture their outdoor exploits on video. This month we get all up in the grill of the latest flagship model, the Hero3.

## MAJOR TECH SPECS:

• White/Silver/Black Editions with video resolution up to 1080p/30fps (White/Silver) and 4K (!) at 15fps in the Black Edition
• 5/11/12 megapixel camera with 3/10/30fps burst, respectively
• 1050 mAh rechargeable lithium-ion battery
• Up to 64GB of external microSD storage
• Built-in Wi-Fi
• Micro USB, Micro HDMI, microSD ports

## KEY FINDINGS:

• With the simple press of a button, the back cover is free, allowing access to a battery pull tab.

• A few clips and a little bit of adhesive hold the front cover in place, but that comes right off with a plastic opening tool.

• Four surprisingly long (8.1mm) T4 Torx screws hold the midframe in place, and are easily removed. A little more prying, and the midframe and motherboard assembly practically fall off. Too easy.

• The image sensor, a Sony IMX117, pops off the motherboard assembly and can be replaced independently of the rest of the internal components.

• A daughterboard holds the microSD slot and a proprietary port used for a variety of GoPro accessories.

• Most components in the Hero3 use very little power and generate minimal heat. A light coating of thermal compound on the image processor is the most aggressive cooling feature in the device.

• A few more Phillips screws stand in the way of pulling out the glass lens.

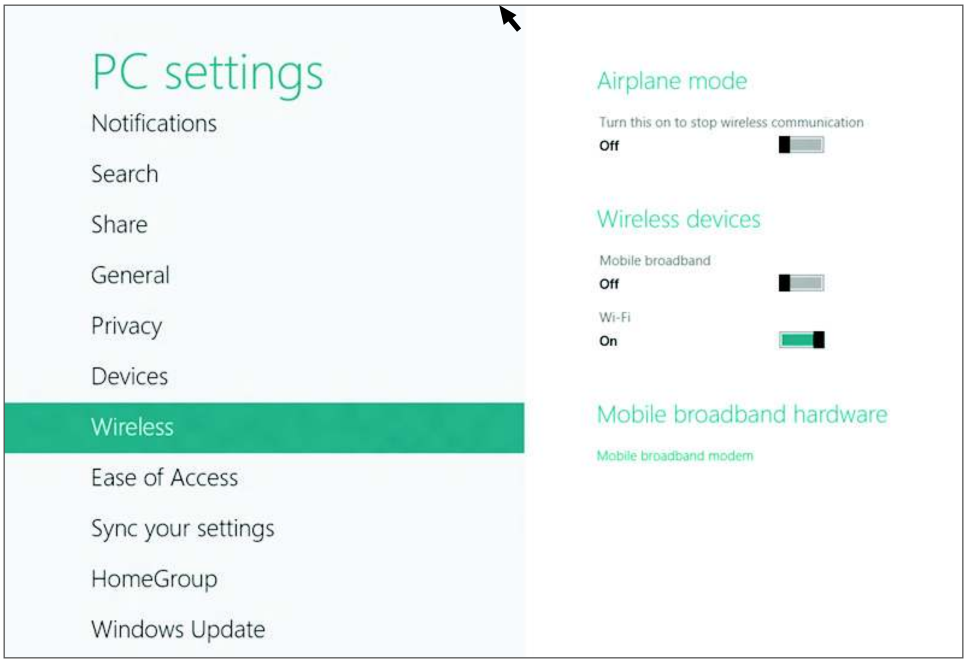
• Because the display cable is adhered to the midframe, replacing the LCD requires use of a heat gun.

• Repairability score: 7 out of 10. The entire device can be disassembled with readily available tools, and a modular design throughout allows replacement of several individual components.

# HOW TO

STEP-BY-STEP GUIDES TO IMPROVING YOUR PC

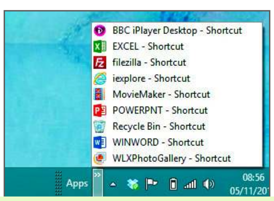
## WINDOWS TIP OF THE MONTH

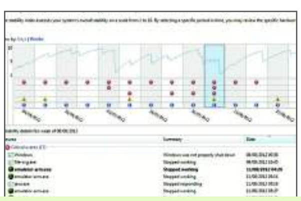



### GO OFF THE GRID WITH AIRPLANE MODE

Windows now supports an Airplane Mode feature similar to the one found on most smartphones. If you're taking a Windows 8 laptop on a plane, or otherwise want to turn off all wireless radios and extend your battery life, just go to the Settings menu, then click Wireless, and toggle Airplane Mode.

## MAKE - USE - CREATE







ALEX CASTLE
**CONTRIBUTING EDITOR**

## SHARE WIN8 APPS ACROSS ACCOUNTS

I'VE GOT MIXED feelings about apps in Windows 8. On one hand, they look great, and work well with touch-enabled PCs. On the other hand, they impose a lot of smartphone-style restrictions that don't necessarily make sense on a PC. For instance, by default, apps that you buy on the Windows Store are tied to your account—if your spouse or children share your computer, they can't access those apps. Fortunately, you can get around this pretty easily.

To do so, start by logging in with the account that you want to share access to your apps, and launch the Windows Store. Select settings, and then click Your Account. In this menu, you'll see a Change User button, which allows you to use a different account to make Windows Store purchases, without changing your general user account. You will still have to manually reinstall apps on each additional account that wants to use them.

↘ submit your How To project idea to: comments@maximumpc.com

# Get the Classic Start Menu Back in Windows 8

## YOU'LL NEED THIS

**WINDOWS 8**
All you need to get started is a copy of Windows 8. We'll describe other, optional software you can use as we go.

**JUST IN CASE** you haven't been paying attention, the Start screen is a major new feature in Windows 8. Generally, it performs all the functions of the Windows 7, Windows Vista, and Windows XP Start menu, but not everyone will take to it straight away. That's why we've put together some tools you can use to bring the Start menu back to the desktop, and we'll even show you how to create a menu of your own. –DAN GRABHAM

## OPTION 1

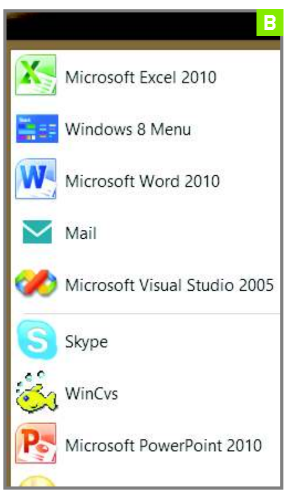
**PIN A FOLDER** First, we're going to walk through the simplest option: Create a folder of your favorite apps and pin it to your taskbar. Find your apps in the C:\Program Files (x86) and C:\Program Files folders, then right-click any application icon you want on your Start menu, then select "Send to" from the menu and choose "Desktop (create shortcut)". Perform this step for each app you want on your Start menu. Don't choose a huge number, though—just the ones you use regularly. View your desktop and you'll see the application shortcuts you've sent there. Right-click the desktop itself and create a new folder.

» Copy the shortcuts into the new folder, call it something like "Apps" and move it to a place where you won't accidentally delete it. Windows can create a toolbar on the taskbar from any folder in Windows. To do this, right-click the taskbar, select Toolbars, and go to New Toolbar. When you see the "Choose a folder" dialog box, browse to the folder you created. If you want to move the button around, right-click the taskbar and make sure you uncheck "Lock the taskbar." Then click the arrow marker at the right-hand side of the toolbar to see your list of apps.




## OPTION 2

**START8** There's no shortage of apps designed to add a Start menu to Windows 8, but it's hard to beat Start8 (www.stardock.com/products/start8), which gives you the complete Windows 7 Start menu, lightly re-skinned to match the Windows 8 feel. Start8 includes all of the shortcuts you're used to (Control Panel, Devices, etc.), and includes several other features, such as the ability to launch straight to the desktop in Windows 8, and integration with Modern UI apps. There's a free trial, and the full version costs $4.99.



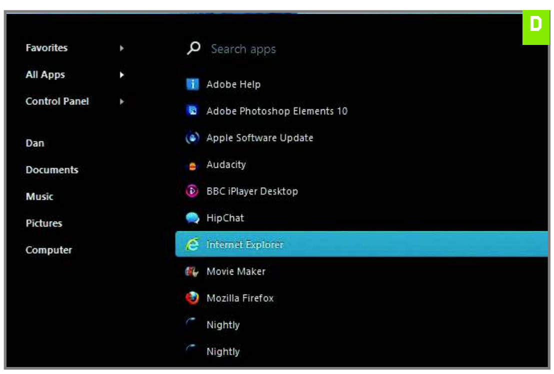

## OPTION 3

**VISTART** Don't want to hand over any cash? One free option is ViStart, which you can download from http://vistart.en.softonic.com. This handy tool was originally designed to bring the Windows 7 Start menu to Windows XP, but it's also a fine option if you want the Start menu back in Windows 8. Just download and install it to get started, but make sure you decline the extra software it offers to install.




## OPTION 4

**POKKI** Then there's Pokki, which you can download from www.pokki.com. It's a complex take on the Start menu that boasts plenty of other functions, too. You can receive Facebook notifications and new email alerts directly in the menu, but if you don't want that, you can still get everything you remember from the Windows 7 Start menu.



# Investigate and Improve Your System's Reliability

## YOU'LL NEED THIS

### WINDOWS VISTA OR LATER

No additional software is needed for this how-to—the Windows Reliability Reporter is built into all versions of Windows, starting with Vista.

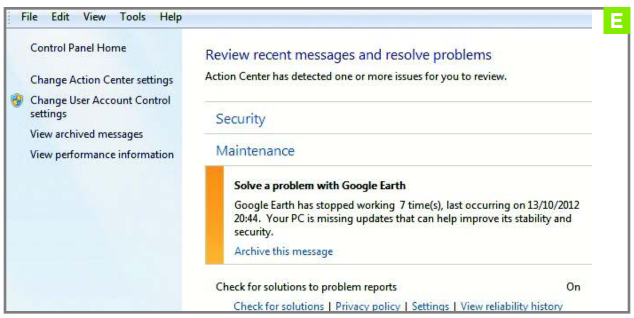
**MODERN WINDOWS** is fast and reliable, but it's not perfect. Programs and services can still silently crash in the background and bring the whole thing to a halt, losing work and data. The problem is, if we don't know about these internal problems, we'll always be at their mercy.

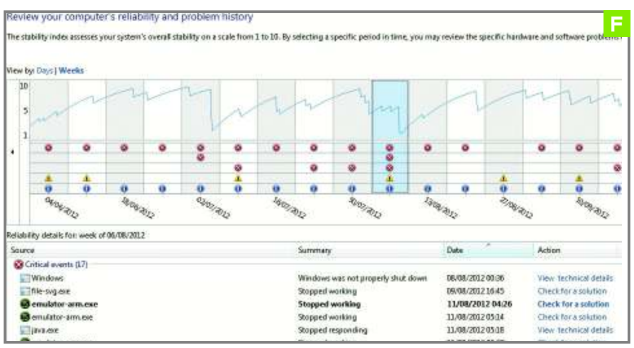
In Windows Vista and later, however, there's built-in help, in the form of the Windows Reliability Monitor. This little-known utility has saved us more than once from an unstable system, and it can do the same for you by pinpointing exactly what's gone wrong. It also gives you peace of mind that malware isn't the cause of your issues. –JON THOMPSON

**1 OPEN WINDOWS 7 PERFORMANCE MONITOR** The Windows 7 Performance Monitor is buried within the depths of the Control Panel. To open it, first open the control panel from the Start button. Once running, click the System and Security section. Within that, click the Action Center, then expand the Maintenance section that appears. Here you'll find the option to view your PC's reliability.

» Click "View reliability history" (image E). This creates a report using the reliability data Windows 7 has stored. The report takes a minute or so to compile and display. Toward the top you'll see a graph that gives a simple indication of your computer's overall reliability. Under that is a chart of the different kinds of problems that are keeping your PC from scoring a perfect 10.

» To get a fuller overview of system reliability, click the Weeks option at the top of the screen. You can scroll back and forth over the weeks with the left and right arrow keys. To drill down into the data, press Enter and a list of all the system problems for the day or week appears in the lower pane (image F).




**2 INVESTIGATE PERFORMANCE ISSUES** Critical events are ones that cause internal failures or complete operating system crashes. They're listed in the top three Failure lines of the data table under the graph. Click the weeks when these occurred to learn more. Double-click an entry to see the technical details.

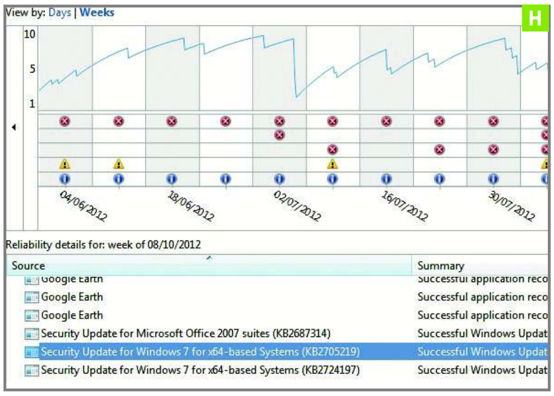
» Windows can help solve issues by accessing its online database of previous problems. To seek out a possible answer, click "Check for a solution" in the Action column of the relevant entry in the lower pane. There's no guarantee Windows can put things right itself, but it's worth a try.

» In order to keep your computer safe and secure, it's essential that your installation of Windows is updated with the latest patches. This should happen without any input from you, but if the automatic update process fails, you usually don't find out about it. Click the weeks that are highlighted with a yellow warning triangle, then look in the lower pane (image G). Are there any Failed Windows Update entries? If so, make a note reminding yourself to update Windows manually later. It will take too long to do right now.

» It's highly likely that as you step back through the reliability history you'll find certain drivers that keep crashing. Sometimes these crashes can cause system instability. This can also happen with browser plugins—Adobe Flash Player is a particular favorite. If you haven't updated such software recently, add it to your list of potential updates for later.

» Select an entry where there are blue "i" symbols in the data (image H). As well as telling you about failures and warnings, Windows Reliability Monitor also tells you about things that have gone well. You can see how the system and applications have been updated automatically. In many cases, these updates happen silently, so this is the only notification you have that they succeeded.





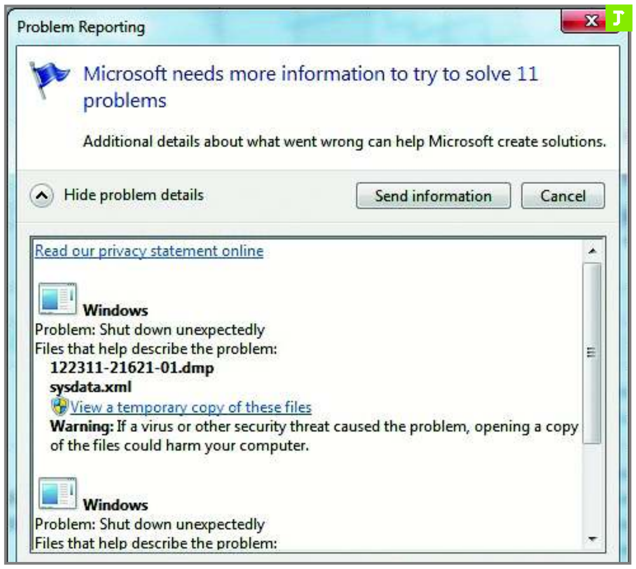

**3 VIEW ALL PROBLEM REPORTS** At the bottom of the screen, you'll find the option to view all problem reports. This produces a long list of all the problems the operating system and installed software have encountered (**image I**). You can sort this list by clicking a column title. You might find that an anonymous report has been sent to Microsoft to help the programmers concerned with system stability.

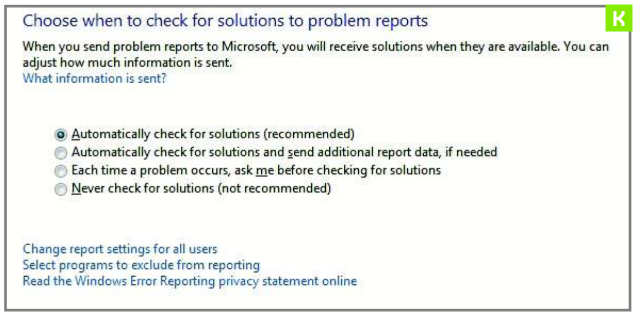
» In the list of problem reports, you'll see solutions listed for certain applications and drivers. Find one and right-click it, then select "View solution." Windows Reliability Monitor accesses what's known about the problem. It might provide instructions for you to follow, or it might give you a link that will let you download a more recent version of the application.

» If you just want to see if there are any available solutions to the collection of problems your computer has encountered to date, go to the main Reliability Monitor screen and click "Check for solutions to all problems". Windows may need to send anonymous information to Microsoft to get solutions (**image J**). If this is the case, click "Send information" to receive any available answers.

» When a program fails, Windows automatically starts looking for a solution, but this isn't always appropriate. Click the back button in Reliability Monitor and open the Maintenance section. Click Settings to set the default behavior when a program crashes. It's best to check for solutions as you go, but you can have Windows ask you what to do when something crashes (**image K**).




**4 UPDATE WINDOWS MANUALLY** Finally, if you need to update Windows, it's time to do so. Click the back button at the top-left of the screen, then click Windows Update at the bottom-left. Click Install Updates. You may have to reboot when this is complete. Check with Reliability Monitor regularly to see if there have been any failures—especially with Windows updates—to keep your PC healthy. ⏻

BUILD IT

JOSH NOREM **SENIOR EDITOR**



# Intel's Next Unit of Computing

Intel's NUC is a pint-size DIY project straight from the labs of Chipzilla itself, so we dove in to see what's needed, how it runs, and whether you should even bother with it

LENGTH OF TIME: **1 HOUR**

LEVEL OF DIFFICULTY: **EASY**

**THE MISSION** This month's Build It is a bit of a reach for us here at *Maximum PC*, simply because we're used to building PCs that are powerful enough to require an intervention from the local overclocking support group. However, we can't ignore the rise of the small PC, or the living room PC, or whatever you want to call these Lilliputian rigs that are suddenly as popular as raging against the OS hate crime named Windows 8. This little machine in particular, the Intel NUC, which stands for Next Unit of Computing, seemingly came about as a reaction to the surprisingly popular Raspberry Pi, which is a tiny bare-bones PC that originated in the UK early last year and sells for just $25. Though the Raspberry Pi was designed to be an affordable gateway drug into the world of command-line hacking, the Intel NUC is a much more complete solution that Intel says is perfect for home entertainment, commercial kiosks, or just quiet, affordable computing. Since the NUC (pronounced Nuck, though we like to call it the Nuke) doesn't include all the bits that you need to make it run, we figured it was a prime candidate for a Build It article.



## NUCTURAL SELECTION

**THE FIRST STAGE** of NUC acquisition involves deciding which NUC to purchase—there are two different SKUs available as of press time. Both have the same basic specs for storage, RAM, and wireless, in that they have none, so you'll have to BYO. They both feature the same 1.8GHz Core i3-3217U Ivy Bridge dual-core Hyper-Threaded CPU soldered to the motherboard, which won't accept a skyscraper heatsink for overclocking, sadly; and both also have three USB 2.0 ports. They then diverge, with one featuring dual HDMI ports for multi-display action, Wi-Fi, and Gigabit Ethernet, and the other sporting one HDMI port, Wi-Fi, and a Thunderbolt port. The dual-HDMI unit features an all-black chassis and will set you back $290, while the T-bolt version goes for $310 and sports a Corvette-like cherry-red roof. There are also two more NUCs coming soon: a high-end NUC with a Core i5 processor and USB 3.0, and a low-end NUC with a Celeron/Atom processor. For this build, we chose the dual-HDMI NUC (model DC32171YE) because we wanted to use it as a quiet, out-of-the-way PC instead of a typical streaming-media-center box. Its core components include two SO-DIMM slots, an mSATA slot for an SSD, a wireless PCI Express port, three USB 2.0 ports, Gigabit Ethernet, and two HDMI ports. Audio is provided by the HDMI or Thunderbolt ports, but you can't connect your speakers to the NUC. There's also a power brick (but oddly no cable that plugs into the wall) and a VESA mounting bracket included. The NUC includes a 3-year warranty and a box that plays the Intel commercial jingle when you open it.

**INGREDIENTS**

| | PART | URL | PRICE |
|---|---|---|---|
| Case | Intel NUC | www.intel.com | $290 |
| SSD | Intel 525 Series 240GB | www.Intel.com | $300 |
| CPU | Intel Core i3-3217u | www.intel.com | N/A |
| GPU | Intel HD4000 | www.intel.com | N/A |
| RAM | 2x 8GB Patriot DDR3/ 1,333 SO-DIMMs | www.patriotmemory.com | $82 |
| Wireless | Intel Centrino 6235 80211.n Mini PCIe | www.intel.com | $32 |
| Power | AC Power Cord | www.amazon.com | $1 |
| OS | Windows 7 Home Premium 64-Bit OEM | www.microsoft.com | $100 |
| Total | | | $805 |

### 1 OPEN THE CASE

IN ORDER to gain access to the NUC's innards, you'll need to remove the bottom panel from the device, which thankfully is quite easy. Since Intel figures you probably won't be popping open the chassis very often to swap out parts, it's gone ahead and secured it with four easy-to-remove Phillips head screws (**image A**). The screws are all captured, too, so you don't have to worry about losing them once you pop off the NUC's ventilated door. With the door removed, we see there's also a way to remove the motherboard from the chassis by removing three more small screws. Though putting a door on the little bugger isn't a big deal, it's appreciated since Intel could have theoretically made the NUC a closed system in an attempt to reduce support calls.


A

### 2 LET'S HAVE A LOOK AROUND

WITH ITS DOME removed we can finally have a look around the NUC to see where everything goes. As you can probably tell, this is the belly of the little beast, or the underside of the mainboard (**image B**), as the Core i3 processor and heatsink/fan assembly are on the other side of the board where active cooling is required to keep things chilly. Down here in passive-cooling land we have a half-length mini PCI Express slot for the wireless card, the full-length mini PCI Express slot for the mSATA drive, two SO-DIMM RAM slots, and one empty header labeled Front Panel. You can't see them but there are Wi-Fi antennae encircling the enclosure; you can see where they attach to the Wireless card. The tiny little mobo rests inside what looks like a crude metal soap dish, though the Intel Desktop Board logo is proudly displayed. We have heard that despite Intel's plans to get out of the motherboard game after Haswell, it does have a roadmap for the NUC, so plan on seeing several more iterations of this bambino rig in the months to come.


B

## 3 RAM THE RAM

THE NUC INCLUDES two SO-DIMM slots, so you'll need to acquire some laptop RAM, or as our Patriot Memory was labeled, "Ultrabook" RAM. We snagged two 8GB SO-DIMMs of Patriot DDR3 PC3-10600 memory, which run at 1,333MHz. We could have gone with 1,600MHz RAM, but we've had some weird experiences previously with overclocked RAM, so for now we're playing it safe. The RAM sticks cost $40 apiece and are a little bit of a splurge for this system's budget, but we threw caution to the wind and maxed out the NUC's memory capacity. Installation is just like it is with a laptop, requiring you to push the DIMMs in at an angle (**image C**), then slowly push them down until they snap into place.




## 4 WIRE UP THE WIRELESS

THE NUC SPORTS a form factor known as uCFF, which stands for "ultra-compact form factor." This means it's tiny, so Intel had to stack some components on top of one another like tenants in a high-rise, and two of these tenants are the wireless card and the mSATA card, which sit on top of one another with about a millimeter between them. Due to this arrangement, you must install the wireless card first, which is as easy as sliding the card into the slot (**image D**) and then attaching the antennae that Intel has prewired to the chassis and dropped down right where the card rests. We connected the black lead to the plug labeled Main and the white lead to Aux, but there's no wrong way to do it. We chose a Wireless N card from Intel but any half-size mini PCI Express card will do. The Intel Wireless N card costs $30, and gave us a consistently strong signal in the office.




## 5 SATA-L-UP

CHOOSING WHICH MSATA SSD you will use in the NUC is arguably the most important decision you and your doctor will make, as it's the only user-upgradeable component that will have a tangible effect on performance. Sadly, modern mSATA SSDs lag behind the blazing-fast 2.5-inch SSDs we all use today, so shopping for one is a bit disconcerting, as names like Samsung, Corsair, and OCZ are nowhere to be found. Instead the choices boil down to Intel, Crucial, Adata, and Mushkin. Since consumers don't typically purchase mSATA SSDs, the pickings are slim. However, the new SandForce SF-2281-powered 525 Series from Intel are a glimmer of hope, as they ride the SATA 6Gb/s interface and are equivalent to the totally fast 520 Series 2.5-inch drives, so we went with the fat 240GB version. To install the drive we simply inserted it into the keyed slot and then secured it using the provided screw (**image E**). And yes, we know this is an expensive SSD, so please don't write us letters saying we spent too much on the drive. This is really just a way to get a good look at what the NUC can do, and a 120GB SSD should offer similar performance.




## 6 INSTALL THE OS

WE USED A USB optical drive to install our OS. We then went to the Intel website and loaded the wireless and Intel QS77 chipset drivers onto a USB key in order to get them onto the NUC. Once that was accomplished, we were good to go. All in all, we had the OS installed to our Intel SSD in roughly 10 minutes, and after Windows Update ran a zillion times and rebooted even more, we were finally up and running within an hour (SP2 please, Microsoft). The first thing we did was to run the Windows Experience Index test, which showed us a score of 5.9—pretty dang good for a munchkin rig like this. To put it in context, the AMD Brazos–based Zotac Zbox Nano XS scored just 3.9 in the same measurement.




**1.** The mSATA drive and wireless card are stacked so tightly that the Thunderbolt NUC will overheat in certain configurations, but we experienced no issues with our dual-HDMI unit.

**2.** The Wi-Fi antennas that are usually wrapped around a laptop's LCD bezel are strung around the NUC's chassis for improved reception, and attach to a Wi-Fi card nestled beneath the SSD.

**3.** The all-black version of the NUC features two HDMI ports, while the red-roofed model has a Thunderbolt port. Neither model has USB 3.0 (sad emoticon).

**4.** On the other side of the mobo (beneath the RAM shown here), lies a Core i3 CPU that's permanently attached and cooled by a heatsink/fan combo that stays extremely hush-hush.

# THE NUC IN THE REAL WORLD, OVERHEATING, AND CONCLUSIONS

WE WERE pleasantly surprised by the NUC, mostly because we've always had a "size matters" mantra in our heads that subliminally controls our expectations about a PC's performance. Given the NUC's small size, and our experience with other pocket PCs like the Raspberry Pi and the Zotac Zbox, we expected the NUC to largely *suck* from a performance point of view. But it didn't. For web browsing, watching movies, and running MS Office it felt just as fast and responsive as any other PC we've used lately. Though you're probably inclined to think its speedy nature is partly due to the Intel 525 Series SSD, we also tried it with a garden-variety Intel 310 SSD, and that felt quite responsive, too.

Since the NUC includes decent onboard graphics care of the Core i3 processor, we fired up Far Cry 3 and Portal 2 to see whether either was playable. Sure enough, the NUC had some major issues with Far Cry 3, but was able to just barely play Portal 2 at native 1080p resolution with all settings on Medium. For kicks, we ran 3DMark 11, and the NUC scored P581. So, gamers need lowered expectations. Media streaming, however, is great. Among the media files we tried on the NUC was a 10GB HD rip of *Avatar*, which ran on the NUC flawlessly. The same file brought the AMD Brazos–equipped Zotac to its knees. The playback stresses the CPU and GPU quite a bit, not to mention the SSD, so we were seriously impressed by its ability to smoothly play such a massive file.

Now, for the bad news: We played around with the Thunderbolt version of the NUC and it overheated in testing. Initially, we suspected faulty RAM since RAM can cause random shutdowns, but when we took the top off the NUC we noticed that the SSD and wireless card were burning hot, so we threw a fan on it and all problems vanished. Obviously, that's not a good long-term solution, but Intel is aware of the problem and is working to rectify it. Whether that involves redesigning the mobo so there's more room between the PCI Express connectors or upping the fan speed remains unknown.

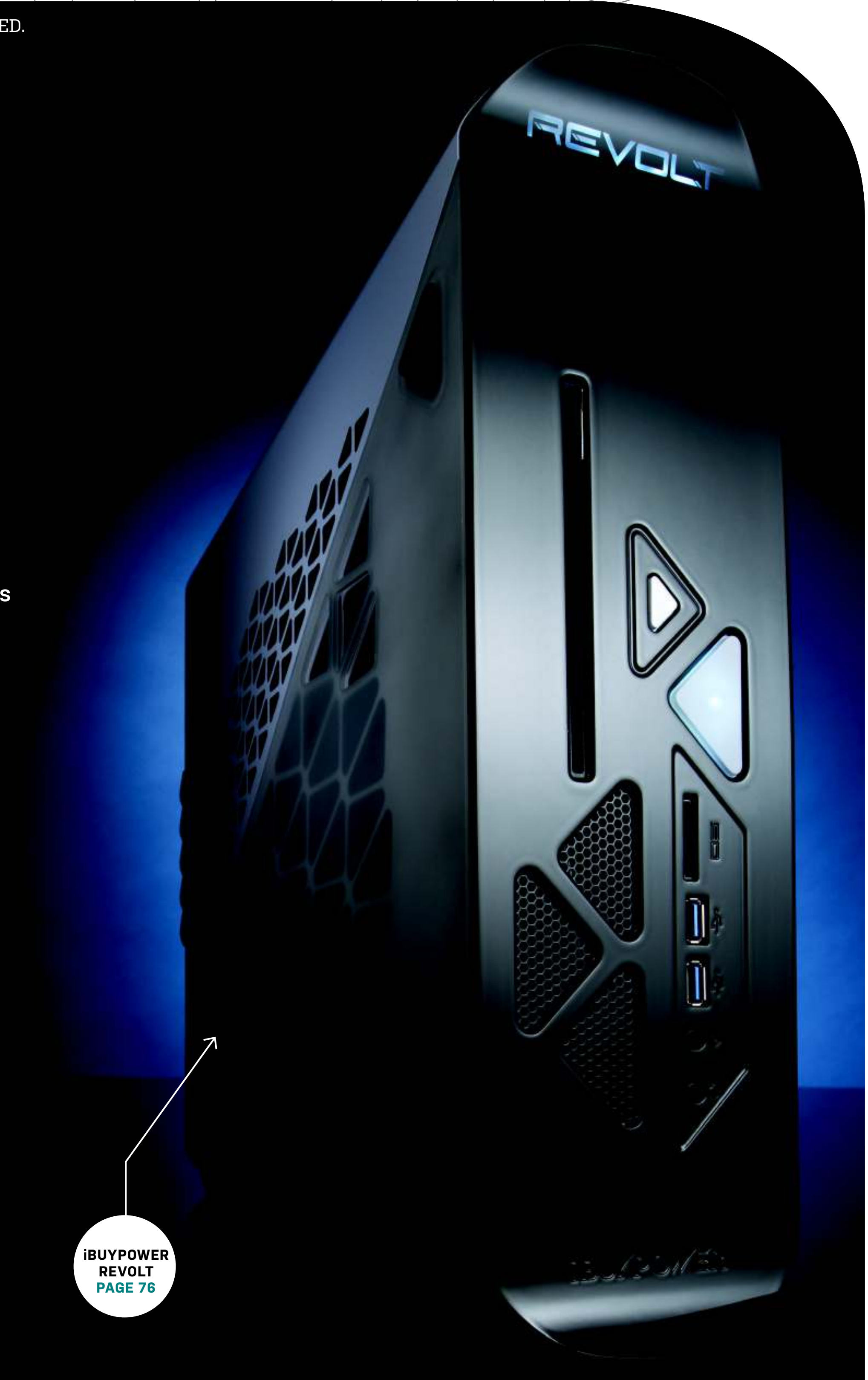
All in all, the NUC is nifty, if not slightly defanged for its lack of USB 3.0. We love its small size, decent amount of horsepower, and silent operation. We would totally buy this for our moms if the overheating issue is rectified. We'd also wait for Gen 2 of the NUC, as the thought of a Core i5 processor and USB 3.0 sounds like a tasty recipe for a quiet, out-of-the-way PC.

# REVIEWS

TESTED. REVIEWED. VERDICTIZED.

## INSIDE






iBUYPOWER REVOLT PAGE 76




The revolt carries on the fight against substandard game consoles.

# iBuypower Revolt

## IBP combines affordability with good performance

**TO REVOLT IS TO** rise up against an oppressive ruling authority. In iBuypower's case, is the new Revolt PC opposing big gaming rigs or game consoles?

We prefer to believe that the Revolt, along with its fellow revolutionaries from Alienware, Falcon Northwest, and Digital Storm, is part of the first expeditionary force attacking the substandard gaming performance that consoles have subjected its citizens to for years.

As we've said of the other small PCs of this ilk, you need only slap a $26 wireless Xbox controller on the Revolt, get it set up with Steam's Big Picture Mode, and you'll not only have a gaming machine that fits in nicely in the living room, but that will also likely blow away even next-gen consoles.

The Revolt uses a new NZXT chassis that iBuypower has exclusive rights to. It's slightly wider than three other similarly shaped boxes we've reviewed from Alienware, Falcon Northwest, and Digital Storm. iBuypower manages to jam in a 14cm NZXT liquid cooler, which lets the Intel Core i7-3770K hum along at an overclocked 4.2GHz. The rig also sports an EVGA GeForce GTX 670 GPU and is large enough to support both an HDD and SSD. This is significant because the box that spurred it all, Alienware's X51, forces you to pick either an HDD or SSD, not both.

While the X51 uses an external power brick, the iBuypower uses an internal FSP 500-watt PSU. There's actually an upside and downside to both setups. The downside here is the noise. Our preproduction Revolt's 1U power supply got shrilly under heavy loads. We had the same issue with Digital Storm's Bolt, which was rectified in shipping units. iBuypower promises improvement in the final units, but ours was just too noisy to be used under load in an HTPC environment. However, seeing how other vendors have been able to tame the issue by tweaking the fan profiles and thermals, we suspect iBuypower will be able to do the same.

Performance of the box against our desktop zero-point, with its hexa-core processor, was not pretty but that's hardly a surprise, considering the ZP's size and parts. Lest you think that a quad-core Ivy Bridge ticking at 4.2GHz is Atom-poo slow, however—it's not. Even in the heavily multithreaded Premiere Pro test, the Ivy Bridge was but 31 percent slower than our Core i7-3930K at 3.8GHz. The GeForce GTX 570 also shows pretty well when you consider that the zero-point is housing a GeForce GTX 690.

We also stacked up the Revolt against the Falcon Northwest Tiki and Digital Storm Bolt (we didn't have the original X51 on which to run our new benchmarks) and found the Revolt competitive but the slow man out against its two peers. Oddly enough, in our Premiere Pro CS6 benchmark, the similarly clocked Revolt ran about 9 percent behind the Tiki and 11 percent behind the Bolt—that's probably partly due to its single-channel RAM.

But there are a couple of ways in which the Revolt excels over those two boxes. For one thing, it has the ability to run when laid flat, which makes it far more flexible for living room use. It also beats both the Tiki and Bolt in the price game. The FNW Tiki we reviewed in September 2012 came equipped with dual 500GB SSDs and a GeForce GTX 680 for $4,126. No doubt 500GB SSDs have dropped in price, but not by that much. The Digital Storm Bolt, reviewed in our January 2013 issue, took the price down to $1,950, using just a 120GB SSD but giving you a GTX 680 card, too. The iBuypower Revolt comes in even lower, at $1,400. Is that a good deal? Spec-for-spec, yes. It's even comparable to Alienware's top-end X51, which gives you a 2TB HDD and 16GB of RAM, but is capped at a GeForce GTX 660 and there's no option for an SSD.

That puts the Revolt in a pretty good spot. No, you can't get it as spec'd-out as the Bolt or Tiki, but at this price, a lot of folks won't care. Overall, iBuypower gets a lot right with the Revolt and brings its trademark practice of packing in the performance without packing on the price. **–GORDON MAH UNG**

**VERDICT 9**

**iBuypower Revolt**

**+ VOLTAGE** Can be laid flat; low price.

**– CURRENT** A bit loud; bigger than other similar machines.

$1,400, www.ibuypower.com

### BENCHMARKS

| | ZERO POINT | |
|---|---|---|
| Premiere Pro CS6 (sec) | 2,000 | 2,905 (-31%) |
| Stitch.Efx 2.0 (sec) | 831 | 823 |
| ProShow Producer 5.0 (sec) | 1,446 | 1,440 |
| x264 HD 5.0 (fps) | 21.1 | 16.2 (-23%) |
| Batman: Arkam City (fps) | 76 | 47 (-38%) |
| 3DMark 11 | 5,847 | 3,173 (-46%) |

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our current desktop test bed consists of a hexa-core 3.2GHz Core i7-3930K 3.8GHz, 8GB of Corsair DDR3/1600, on an Asus Sabertooth X79 motherboard. We are running a GeForce GTX 690, an OCZ Vertex 3 SSD, and 64-bit Windows 7 Professional.

### SPECIFICATIONS

| | |
|---|---|
| Processor | Intel Core i7-3770K@4.2GHz |
| Mobo | iBuypower Z77E |
| RAM | 8GB DDR3/1600 single-channel |
| Video Card | EVGA GeForce GTX 670 |
| Sound Card | Onboard |
| Storage | 120GB Intel 330 Series SSD, 1TB WD Caviar Blue |
| Optical | Blu-ray combo drive WH14N540 |
| Case/PSU | Custom / FSP 500W |



While the Armor Evolution is nicely adorned, we recommend waiting for the 2.0 version.

# Mid-Tower Collision

## Two go in, one comes out

Two cases enter, one case leaves: That's the gist of our mini-roundup this month. We're still amazed sometimes at the disparity in production quality between cases. Sometimes, it's as if manufacturers really don't even bother giving the case a quick run-through before sending it off to retailers. Other times, it feels as if manufacturers go over their cases with a fine-toothed comb, checking every detail and nuance to eliminate even the smallest of possible annoyances.

We've done our own version of the latter. Up for battle this month are Rosewill's Armor Evolution and NZXT's Phantom 630. Which case will take the prize? –**DAVID MURPHY**

### ROSEWILL ARMOR EVOLUTION

We want to like Rosewill's Armor Evolution chassis; we really do. It's even a credit to the company that some of the case's major flaws are elements that Rosewill actually recognizes as problems—or has received plenty of angry emails about—and is actively working to fix with a new revision of the case and/or a promise to send customers parts to patch up the first-generation chassis.

Nevertheless, there are still a few unfixable design choices about this mid-tower chassis that leave us a bit bewildered. We definitely recommend skipping this case in its first iteration; as to how Rosewill will let its customers know whether they are purchasing a fixed version of this jet-black steel case, that's anyone's guess.

The spacious case feels a bit stout when you pull it out of the box but, trust us, it's just short. The case's depth is hardly different than most mid-tower chassis you're used to and, to Rosewill's credit, the case's shorter height does little to impact its overall capacity. You get three free, screwless optical drive bays to play with, alongside seven hard drive bays—which still force you to screw the drives into removable trays, but at least you can do that outside of the case itself.

To get to the bays, you have to confront Armor Evolution Problem Number One: The case's side panels can be a pain in the butt to remove, thanks to fairly flimsy locking tabs that bend out of place, break, or otherwise force you to exert more *oomph* than you ever would expect to get the panel off. The panels themselves are flimsy too, easily bulging in and out at the center with the lightest of touches. We don't like the hole motif of the left panel's grill (we get it; they're fan mounts. Lordy), nor do we like the very, very tight amount of space Rosewill puts between the rear of the motherboard tray and the case's right side panel.

We would normally love the fact that Rosewill packs the Armor Evolution to the gills with fans—six in total, including a huge 23cm fan on the left side panel and two 12cm red LED fans on the case's front. This chassis is as cooled as cooled can be with air, and it doesn't explode your eardrums when you have all of the blades a-spinnin'.

We don't particularly care for the tiny button that Rosewill puts on the underside of the case's front panel—the one that lets you toggle the case fans' lighting on and off. Unless you enjoy lifting your case each time you want to flip on the light show, this could not be any more annoying a setup. Until you hit the case's insides, that is: For whatever mystifying reason, Rosewill decided to make it so that you screw into rubber grommets for the case's two top fans. This makes both fans easy to jostle out of security with but a bump; we'd be absolutely terrified to attach a heavier radiator to the case's top, which makes its support for liquid cooling fairly nonexistent.

Everything else about this chassis is fairly nondescript: two USB 2.0 and two USB 3.0 ports on the case's top, plenty of rubberized cable-management holes on the tray, a decent amount of screw-free upgradability. In other words, the case runs average-to-good if you take all of its critical flaws and push them aside.



NZXT's Phantom 630 brings the wow factor.

Assuming Rosewill does that by employing promised fixes, and cuts the $120 chassis' price a bit, the Armor Evolution would be worth a spot under your desk. Otherwise, aim for a less-sloppy, sub-$100 case like the Corsair Carbide 200R, to name one.

VERDICT 5

**Rosewill Armor Evolution**

$120, www.rosewill.com

**NZXT PHANTOM 630**

Someone's been watching a little too much *Honey, I Shrunk the Kids*. But in the case of NZXT's Phantom 630… er… case, that's a good thing. And when you really look at the tale of the tape, this case isn't all that much smaller than NZXT's Phantom 820—its bigger, louder cousin that comes with a few more eccentricities than the 630, but, to be honest, a few more headaches, as well.

NZXT's really tightened the hatches to deliver a compelling experience with its "ultra tower" chassis—we'll forgive the silly description there. Though it's a wee bit pricey, this case definitely summons up a "wow" factor with its sleek, easily accessible design and captivating fan-control system. In fact, we don't really have any outright complaints with this chassis; suggestions and dreams, perhaps, but nothing about this case stands out in a negative light.

Where to begin? The case's four 5.25-inch drive bays are completely screwless and don't require you to painstakingly pop off a front panel on the chassis in order to gain access. Just open up the case's magnetically attached front-panel cover, pop off one of the bay covers, and you're good to go—assuming you've already unscrewed and removed the 630's elegant-slash-lovely left side panel, of course. A note on that: We love the subtle, grilled treatment that NZXT gives to the side panel's attached 20cm fan, hiding it just enough that it's not a monster eyesore below the panel's smaller window.

Slapping up to six hard drives in the case's available bays is a bit mix-and-match, but that's a good thing. The drives themselves use easily configurable trays that slide right into the three separate drive bay compartments, which are themselves removable and interchangeable depending on your preferences and need to accommodate longer video cards. You can even mount a 12cm fan directly on the side of one of the bays and pivot it to blast air across any part of your setup that needs it.

The case comes with a considerable amount of cooling preinstalled. In addition to the aforementioned side-panel fan, you get one 20cm fan in the front (your mechanical hard drives will love you), one 20cm fan up top, and a single 14cm exhaust fan on the case's rear. They're all wired up to the 630's best feature—a built-in fan controller that you can operate from a switch and button setup directly on the front-top of the chassis. Pick from a low, medium, or high speed, and flick the case's included white lighting on and off at the press of a button—it's as easy as powering up your system.

While it is a mild letdown that the 630 doesn't give you a switch for changing the internal lighting to any color you want, we love how the system's entire fan setup is powered by a single Molex connector. We had a bit of trouble getting the fan controller to work in the Phantom 820, so it's a joy and a relief to see a much easier setup in its "lesser" iteration.

We're appreciative of the case's six major routing holes for cables, in addition to a large, cutout area on the motherboard tray for simplified aftermarket CPU cooler installation. There's plenty of room between the tray and the right side panel for your cables—even two 2.5-inch drives, if you're ambitious—and the tray itself comes with the motherboard standoffs preinstalled for your convenience.

In other words, what's *not* to like about the NZXT Phantom 630? Spoiler: Nothing. We're always fans of more pizzazz but, as constructed, there's really nothing to dislike about this one.

VERDICT 9 KICK ASS!

**NZXT Phantom 630**

$180, www.nzxt.com




The spare elegance of the S7's aluminum interior is complemented by its stylish white Gorilla Glass display frame and lid.

# Acer S7

## As capable as it is captivating

**AS IF THE ACER S7'S** seductively slim figure and supremely good looks weren't enough, this skinny vixen of a portable also boasts an impressive performance acumen. It must drive the competition crazy.

Setting a new standard in svelte, the 13-inch S7 measures less than a half-inch at its thickest and its carry weight comes in under three pounds. As a result, it's nearly effortless to tote around. And tote it around you will, if you're a sucker for admiring glances. Besides attracting attention with its pancake-flat form factor, the S7 sports a striking glossy-white lid made of Gorilla Glass, for the dual purpose of durability and style. A simple Acer logo glows blue when the S7 is powered on.

When open, the S7's elegant anodized aluminum interior, backlit keyboard, and glass touchpad steal the show. As does its IPS screen, which features a precedent-setting 1920x1080 res—at least, it's a first among the Ultrabooks we've tested. Images look sharp and vibrant from any angle, although the screen's glossy surface inevitably picks up the glare of environmental light.

In use, the chiclet keyboard is extremely shallow, with minimal travel, but that's an inevitable consequence of the notebook's ultra-low profile. It took us just a little while to get used to the feel, and the size and spacing of the keys are suitable for serious typing. The touchpad, while extremely smooth, is made by Elan Microelectronics and felt slightly laggy compared to Synaptics-powered pads. Anyway, you'll likely be performing many of these functions via the highly responsive 10-point touchscreen.

Lest you think the S7's beauty is all on the surface, take a gander at the benchmarks. Yes, this is the first Ultrabook we've tested to top the scores of our Intel reference zero-point. Intel's UB has had a distinct advantage in not being a shipping product and thus clocked more aggressively than the production Ultrabooks we've tested. But the S7's 1.9GHz Core i7-3517U, dual-channel RAM, and pair of 128GB SSDs in RAID 0 gave it a clear, albeit modest, performance advantage in all of our benchmarks. Under heavy load, the two small 10,000rpm fans inside the S7—one to pull in cool air, the other to push it out—become quite audible, but the machine stays comfortably cool, with most heat concentrated at the back.

The only thing tempering our extreme infatuation with the S7 is its relatively weak battery life. Granted, this month we switched our rundown test from a looped standard-def video to a ripped Blu-ray file using VLC, but even so, the S7 only lasted two hours, 40 minutes, compared to the zero-point's three hours, 40 minutes under the same conditions. For a device that's so clearly made for mobility, this is a disappointment. To be fair, the S7 is about a third thinner than the reference Ultrabook.

We can acknowledge that this thin a device with this much power is bound to make allowances somewhere. When you toss in the included carrying case, matching white wireless mouse, and expansion dongles, the fetching S7 makes a pretty compelling case for its premium price tag. –**KATHERINE STEVENSON**

VERDICT 9 KICK ASS!

**Acer S7**

**+ S7** Beautiful and well-built; impressive performance; IPS touchscreen.

**− L7** Weak battery life; touchpad is a bit laggy; expensive.

$1,650, www.acer.com

### BENCHMARKS

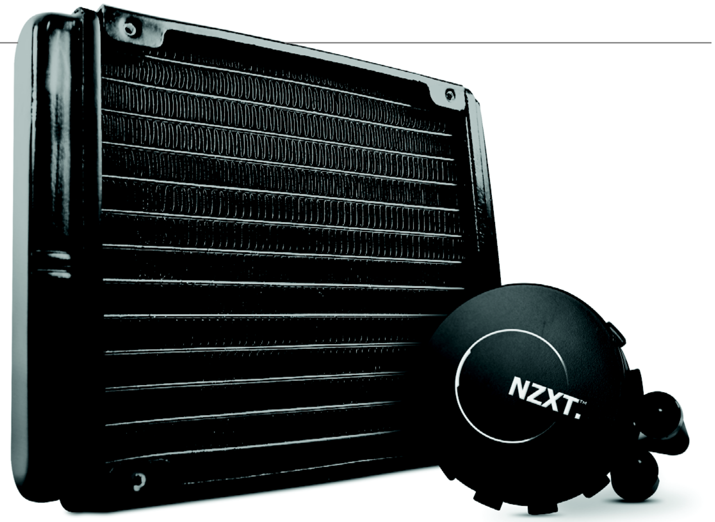
| | ZERO POINT | |
|---|---|---|
| Premiere Pro CS3 (sec) | 840 | 780 |
| Photoshop CS3 (sec) | 100 | 96 |
| Proshow Producer (sec) | 1,122 | 1,032 |
| MainConcept (sec) | 1,901 | 1,779 |
| Quake III (fps) | 358.2 | 392.9 |
| Quake 4 (fps) | 76.1 | 78.8 |
| Battery Life (min) | 221 | 160 (-27.6%) |

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Our zero-point ultraportable is an Intel reference Ultrabook with a 1.8GHz Intel Core i5-3427U, 4GB of DDR3/1600 RAM, integrated graphics, a 240GB SSD, and Windows 8 64-bit.

### SPECIFICATIONS

| | |
|---|---|
| CPU | 1.9GHz Core i7-3517U |
| RAM | 4GB DDR3/1333 dual-channel RAM |
| Display | 13.3-inch 1920x1080 IPS LCD |
| Storage | 2x 128GB SSD in RAID 0 |
| Connectivity | 2x USB 3.0, Micro-HDMI, headphone/mic input, 2-in-1 card reader, 802.11n, Bluetooth 4.0, 1.3MP webcam, Micro-HDMI-to-VGA dongle, USB-to-Ethernet Dongle |
| Lap / Carry | 2 lbs, 13.3 oz / 3 lbs, 8 oz |



The X40 offers unrivaled cooling performance on quiet mode.

# NZXT Kraken X40

## A crackin' cool-and-quiet cooler

**THE KRAKEN X40** breaks the current trend of closed-loop water coolers rocking 12cm fans by upping its fan size to 14cm fan, which NZXT promises delivers more heat dissipation and better cooling without subjecting users to deafening fan noise. It's a lofty promise, but having tested it, we can tell you that this Kraken's bite lives up to its bark.

The X40 is based on Asetek's fourth-generation all-in-one closed-loop design, which features a copper cold plate that has been improved with denser micro-fins and a new center channel to increase coolant flow. A single NZXT FX-140 PWM fan is included, and the cooler supports an optional second fan for a push-pull config. It's compatible with all modern CPU sockets, with the exception of LGA775, but faces a larger compatibility obstacle in that it requires a case with a 14cm fan, such as NZXT's own Phantom 410. The X40 also sports extra-long 16-inch rubber tubing compared to most other closed-loop systems that use tubes measuring around 12 inches. Accompanying the larger fan is a wider radiator that offers 36 percent more surface area than smaller 12cm rads.

Like Corsair's H80i that we reviewed last month, the X40 has an LED on top of the pump that you customize to either remain a solid color or to change color depending on temperature, which is slick. We also appreciate that the software to control it comes bundled on disc, whereas Corsair's software requires a download. The software is easy to use and allows you to adjust fan speeds, but not pump speeds like Corsair's equivalent. While it features only two presets, "silent" (1,000rpm) and "extreme" (1,700rpm), as opposed to the half-dozen with Corsair's software, you can still manually set the fans to run at fixed RPMs and save custom profiles.

Installing the X40 was relatively easy. With our LGA2011 backplate preinstalled, we began by inserting four screws through the retention ring that allows the water block to be mounted to the CPU socket. The X40 features a similar retention ring to Thermaltake's Water2.0 Pro, which snaps onto the water block with a retention clip. This mounting process isn't as straightforward as the H80i's simple magnetic mounting bracket, but the X40's manual features excellent illustrations that simplify the installation process. Mounting the radiator and fan to the chassis just required tightening four screws through the back of the case. The last step was to connect the CPU fan and USB cables to the mobo headers, and unlike the H80i, all the cables come pre-attached to the water block, and the pump doesn't require additional power (Molex or SATA), making the installation less of a hassle.

In testing, the Kraken X40 was impressive, and we were pleasantly surprised to find that the preset silent mode not only lived up to its name, but cooled extremely well, hitting just 67 C under load. This was enough to whoop our Hyper 212 zero-point air cooler in performance mode by 7 C, and it also bested the 12cm Seidon 120M water cooler running on full blast by 1 C. With the X40's fan cranked to maximum, it gave Corsair's H80i a run for its money even though we had it running in push-pull mode with two fans, which was quite impressive. While the X40's fan can be mistaken for a small leaf blower at full speed, it fortunately doesn't need to operate at its highest speed to cool well.

While the X40 isn't cheap at 100 bones, it's no costlier than its peers and it outperforms them, making this cooler easy to recommend. If you have a case that supports a 14cm fan, you should definitely release the Kraken! –JIMMY THANG

### BENCHMARKS

| | NZXT Kraken X40 (Quiet mode) | NZXT Kraken X40 (Performance mode) | CM Hyper 212 EVO (Performance mode) | Cooler Master Seidon 120M (Performance mode) | Corsair H80i (Performance mode) |
|---|---|---|---|---|---|
| Ambient Air | 22.1 | 22.5 | 23.8 | 21.6 | 25.2 |
| Idle Temperature | 32.6 | 32.1 | 36.2 | 30.7 | 33.3 |
| Burn Temperature | 67 | 63.1 | 74 | 68.3 | **62.6** |
| Burn - Ambient | 44.9 | 40.6 | 50.2 | 46.7 | **37.4** |

All temperatures in degrees Celsius. Best scores bolded. All tests performed using an Intel Core i7-3960 at 4.2GHz, on an Asus P9X79 Deluxe motherboard in a Thermaltake Level 10 GT with stock fans set to High.

VERDICT 9 KICK ASS!

**NZXT Kraken X40**

➕ CLASH OF THE TITANS (1981)
Super cool and quiet; customizable and easy-to-use software.

➖ CLASH OF THE TITANS (2010)
Expensive; requires 14cm-compatible chassis.

$100, www.nzxt.com

### SPECIFICATIONS

| | |
|---|---|
| Radiator Dimensions (H x D x W) | 5.5 x 6.7 x 1.0 inches |
| Weight | 1.9 lbs |
| Stock Fans | 1x 14cm PWM |
| Socket Support | LGA1155/1156/1366/2011; AM2/ AM2+/AM3/AM3+/FM1 |
| Additional Fan Support | One 14cm (screws included) |

The MiniStation has a belly-mounted white LED that "breathes" when there's drive activity; we dig it.




# Buffalo MiniStation Thunderbolt 500GB

## Designed for Mac users and priced accordingly

**PC USERS HAVE** been in a bit of a quandary about the new Thunderbolt interface from Intel. On the one hand, we're all about maximum performance, so given its sizable speed advantage over USB 3.0, at least on paper, we're eager to adopt it. On the other hand, there are three issues that have prevented us from jumping on the Thunderbolt bandwagon with both feet. The first is the fact that it debuted on the Apple platform. Granted, we're a bit sensitive, but this just rubbed us the wrong way. Second, Thunderbolt doesn't exist on LGA2011 due to a requirement for integrated graphics. And finally, we already have USB 3.0, so do we really need Thunderbolt? Sure, it's twice as fast on paper (10Gb/s versus 5Gb/s), but will we see that benefit in the real world, and is it worth the cost? To help us answer all these nagging questions we snagged a very special hard drive, the Buffalo MiniStation Thunderbolt, which has both USB 3.0 and Thunderbolt ports, allowing us to test both interfaces back-to-back and make an apples-to-apples comparison.

Upon first glance, it's apparent this is a Mac-oriented drive, both in its Thunderbolt support as well as its aluminum exterior and rounded edges. It doesn't help that the documentation for the drive states that it comes preformatted for Macs, but don't prejudge the drive just yet—that's our job. In addition to shipping with both T-bolt and USB 3.0 interfaces, the drive also includes both cables, which is amazing since a Thunderbolt cable costs $50 alone. Inside the enclosure lies a 5,400rpm Samsung hard drive with 8MB of cache. The drive includes a 3-year warranty, is also offered in 1TB capacity, and includes no software whatsoever.

To test the drive, we performed real-world and synthetic tests, and came to a somewhat unsurprising conclusion—in this iteration, with a 5,400rpm hard drive inside of it, this device is hamstrung by the drive itself, not the interface. In every test we ran, the drive performed exactly the same regardless of the interface we used, making the benefit of Thunderbolt in this instance primarily one of convenience rather than performance. For example, it would be useful if you are a person who owns both a Mac with Thunderbolt and a PC with USB 3.0, or an older MacBook with just USB 2.0 ports. Or you could be a PC user who wants the flexibility of using Thunderbolt and USB for file-sharing with buddies. Either way, the drive isn't any faster on either interface in its current form. Not only did it score the exact same write times down to the second when we copied 30GB of data, but it scored the same read and write speeds in HD Tune and ATTO, as well. For example, HD Tune clocked the drive at 80.7MB/s read speeds via Thunderbolt, and when using USB 3.0 it ran at 80.8MB/s.

Now for the bad news: This drive costs $200 for 500GB, which is wildly expensive since you can get a Toshiba Canvio 1.5TB drive that is just as fast as the MiniStation for just $110. Thunderbolt could one day be the bitchin' interface we're all using, but for now it's too exotic and overpriced compared to USB 3.0. –JOSH NOREM

VERDICT **6**

**Buffalo MiniStation Thunderbolt 500GB**

+ **THUNDERBOLT INTERFACE** Thunderbolt cable is included; chassis seems rugged.

– **THUNDERBIRD WINE** Too expensive; Thunderbolt provides zero speed benefit over USB; 3-year warranty; no software.

$200, www.buffalotech.com

# Sony Vaio Tap 20 Mobile Desktop

## Meet the laptablet

**SONY MARKETS** its Vaio Tap 20 as a mobile desktop, but you could say that about any portable computer. We think "laptablet" is closer to the mark. With its 20-inch display, the Tap 20 is both an oversize laptop and a gargantuan tablet. And it wouldn't make any sense at all without Windows 8.

Yes, Windows 8 is the operating system PC enthusiasts love to hate, but this machine is proof that Microsoft's strategy of melding the desktop and mobile experiences can work. The Tap 20 isn't perfect by a long shot, but it's pretty darn cool. We challenge you to spend a few minutes with it and not find yourself grinning like a fool in love. And if you pass that test, fire up one of the free pinball games Sony throws in, orient the device in portrait mode, and stroke the screen to pull back the plunger.

The model we tested was outfitted with a 1.7GHz Intel Core i5-3317U mobile processor, but only 4GB of DDR3/1600 memory. Considering the price of memory, and this machine's occasionally sluggish performance, we think Sony should have doubled it. If you decide to buy one, we'd recommend spending the extra $200 to buy the next model up, which does just that. That model also has a 1.9GHz Intel Core i7 proc and a larger hard drive (1TB versus the 750GB in the model sent for this review; both drives are 5,400rpm spinners).

The Tap 20 features a 20-inch LED-backlit IPS display—with 10 touch points, natch—which is essential when you consider all the angles at which you might end up using it. The 1600x900 touchscreen is very responsive, as we discovered when playing the aforementioned pinball games. And while the integrated graphics aren't strong enough for playing A-level games, they did a fine job with the more casual variety. We were particularly impressed with the speed at which we were able to operate the flippers. We were thinking it would be even more fun if the games' physics responded to tilting, but that might have resulted in a little too much reality: It would require holding the device stock still and perfectly level.

You can use the folding stand on the back of the display to position it at an infinite number of angles for reading, or you can fold it completely flat and use the tablet horizontally. The stand does double-duty as a handle when you want to take the device into another room (did we mention it can run on battery power? It lasted three hours in our test). But we wish the handle was a wee bit thicker, had more-rounded edges, or was padded, because we could feel every ounce of the Tap 20's 11.46-pounds digging into the backs of our fingers as we lugged it around. It's also a little awkward to set up, because natural movement would have you lay it down flat on its screen—and if you have kids, you know they're going to do just that. It takes two hands to flip it around and stand it up on its easel.

The speakers mounted on the back of the display are borderline terrible, but that's typical of even all-in-one desktop PCs. Do yourself a favor and plug in headphones. Speaking of all-in-ones, the Tap 20 could fill that role, too. Its biggest shortcoming is the lack of an HDMI input—although that's really more of a missed opportunity than a deal-breaker.

There's nothing else remotely like the Vaio Tap 20, and we applaud Sony's audacity for bringing it to market. Priced at a cool grand, this machine is hardly an impulse buy; but it reminds us why we love computers so much. –**MICHAEL BROWN**

### SPECIFICATIONS

| | |
|---|---|
| CPU | 1.7GHz Intel Core i5-3317U |
| GPU | Integrated Intel HD Graphics 4000 |
| RAM | 4GB DDR3/1600 |
| Display | 20-inch, 1600x900 |
| Storage | Toshiba Travelstar 5K750 750GB, 5,400rpm |
| Connectivity | 2x USB 3.0, memory card reader, headphone, mic, webcam, 802.11b/g/n, Bluetooth, NFC, gigabit Ethernet |
| Lap | 11 lbs, 4.6 oz |

### BENCHMARKS

| | Sony VAIO Tap 20 | Asus ET2300INTI-B022K |
|---|---|---|
| 3DMark 11 | P568 | **P1,313** |
| Metro 2033 (fps) | WNR | **20.8** |
| Adobe Premiere (sec) | 956 | **461** |
| MainConcept (sec) | 2,257 | **1,026** |
| ProShow Producer (sec) | 1,242 | **562** |

WNR=Would not run. Best scores are bolded.

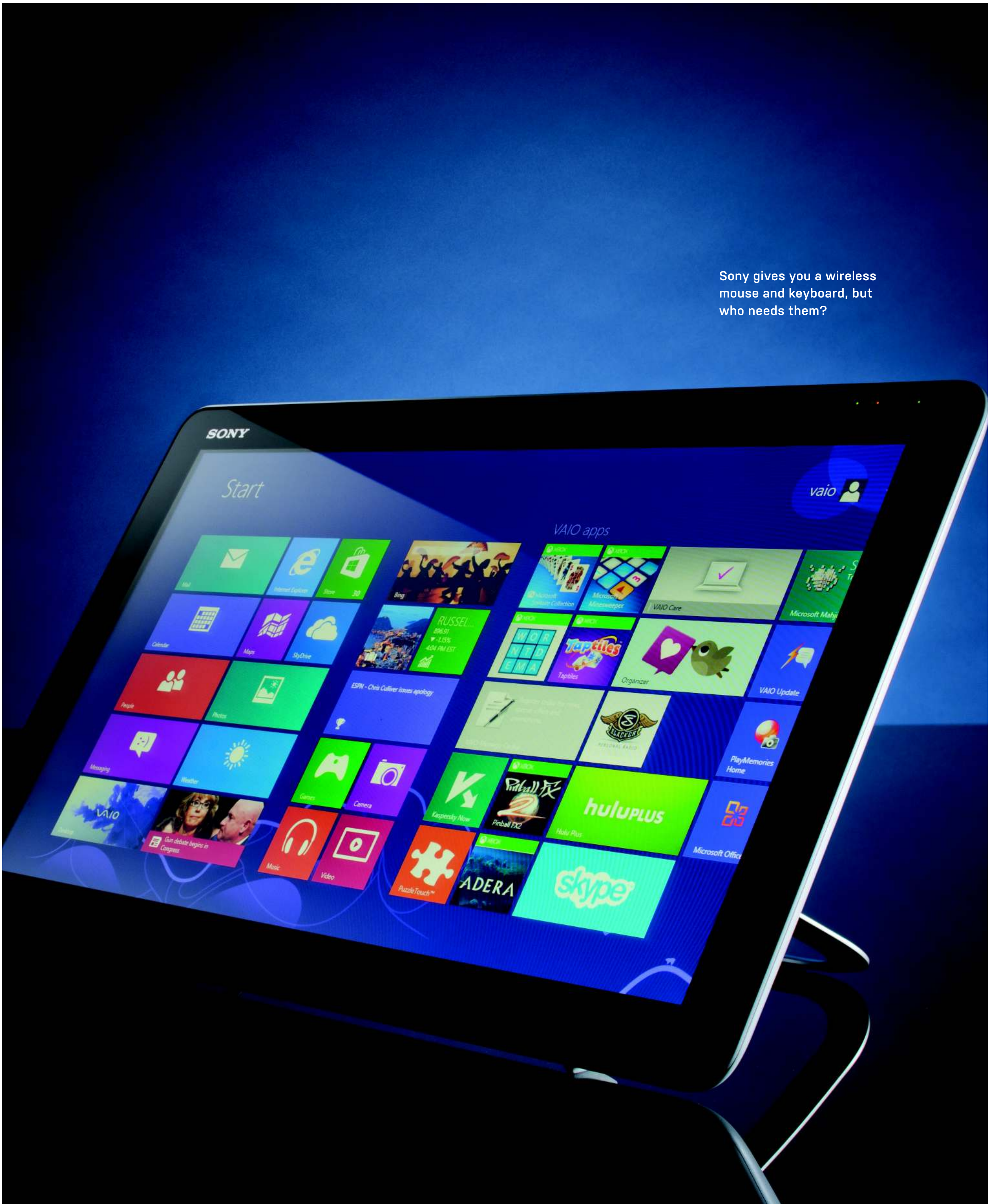
**VERDICT 8**

**Sony Vaio Tap 20 Mobile Desktop**

**+ REVEILLE** Unique, innovative design; makes a fabulous pinball simulator.

**– TAPS** Only 4GB of memory; no HDMI in (or out); very slow benchmark performances.

$1,000, www.sony.com




Sony gives you a wireless mouse and keyboard, but who needs them?




The HTC 8X has impressive technology, including a unibody shell, a dazzling display, and Beats by Dre audio.

# HTC Windows Phone 8X

## The signature Win8 phone falls short

**THE HTC WINDOWS PHONE 8X** was supposed to be the model that would bring Windows Phone 8 to the masses, but after testing it, our overall feeling is, "meh." The HTC 8X is fairly average in size, but it's thinner around the edges, giving the impression that it's more svelte than it actually is. It also has a polycarbonate shell that makes it feel like a premium device, and its unibody design feels solid at the expense of a memory slot and replaceable battery.

The front of the HTC 8X is taken up by a 4.3-inch HD display that includes a front-facing wide-angle lens and three keys at the bottom for back, search, and menu. The display is easily as sharp as Apple's Retina display, and the top of the HTC 8X features just a 3.5mm headphone jack and the lock button. The left-hand side of the HTC 8X is bare, while the bottom holds a Micro USB port. The volume rocker is on the right and below it is a camera shutter button. The rear of the 8X displays the Beats Audio logo, and there is another camera with LED light and a fast f/2.0 lens.

As far as the Windows 8 OS goes, there's one word that springs to mind, and that's "elegance." If you haven't used a Windows mobile product since the clunky old era, you'll think we're joking, but we're not. We love Windows Phone 8, even more than the desktop OS in some ways. Those tiles that are annoying on the desktop are front and center on the 8X home screen, and each tile represents a program that updates with live information. For example, your mail live tile will show an envelope when you have new email, a number will appear for unread messages, and also for missed calls and texts. The calendar tile displays appointments and updates as they change, but will only show one calendar from one service at a time, which is one of our biggest gripes about the phone.

At least it suffers no lag—which just goes to show that you can get away with a dual-core rather than a quad-core processor. We'll also go so far as to say that we think the contacts implementation on Windows Phone is the best out there, bar none. Here's why: Rather than simply being an app, it's a fundamental part of the WP8 OS that runs through it like a vein. When you go into the People section, you're greeted with tabs that you can swipe through that show social media updates, who you've spoken with recently, and a tab called Together, which allows you to create a little group of contacts for a group chat and file sharing, but only with other W8 users.

Probably the biggest disappointment with the 8X is that the app store is so deficient, and though it will likely grow over time, consumers have very little patience; nobody wants to buy a phone just to be able to use some cool apps in six months or a year. They want them now, and Microsoft can't compete with Google and Apple on this front at this time. We also were disappointed by the battery life, which after a day of moderate usage was almost always dipping into the single digits by the time we were heading home.

Overall, we love the OS and the handset design, but the phone has too many drawbacks to be "the one" Windows 8 phone at the moment. Perhaps that distinction will fall to the upcoming Nokia Lumia 920. –**PHIL LAVELLE**

### SPECIFICATIONS

| | |
|---|---|
| OS | Windows Phone 8 |
| Processor | Dual-core Qualcomm S4 1.5GHz |
| Display | 1280x720 |
| Capacity | 16GB |
| Cameras | 2.1MP front, 8MP rear |
| Video | 1080p |
| Connectivity | Bluetooth 3.1, 802.11b/g/n, HSDPA, LTE |
| Battery | 1,800mAh |
| Dimensions | 5.21x2.61x0.40 |

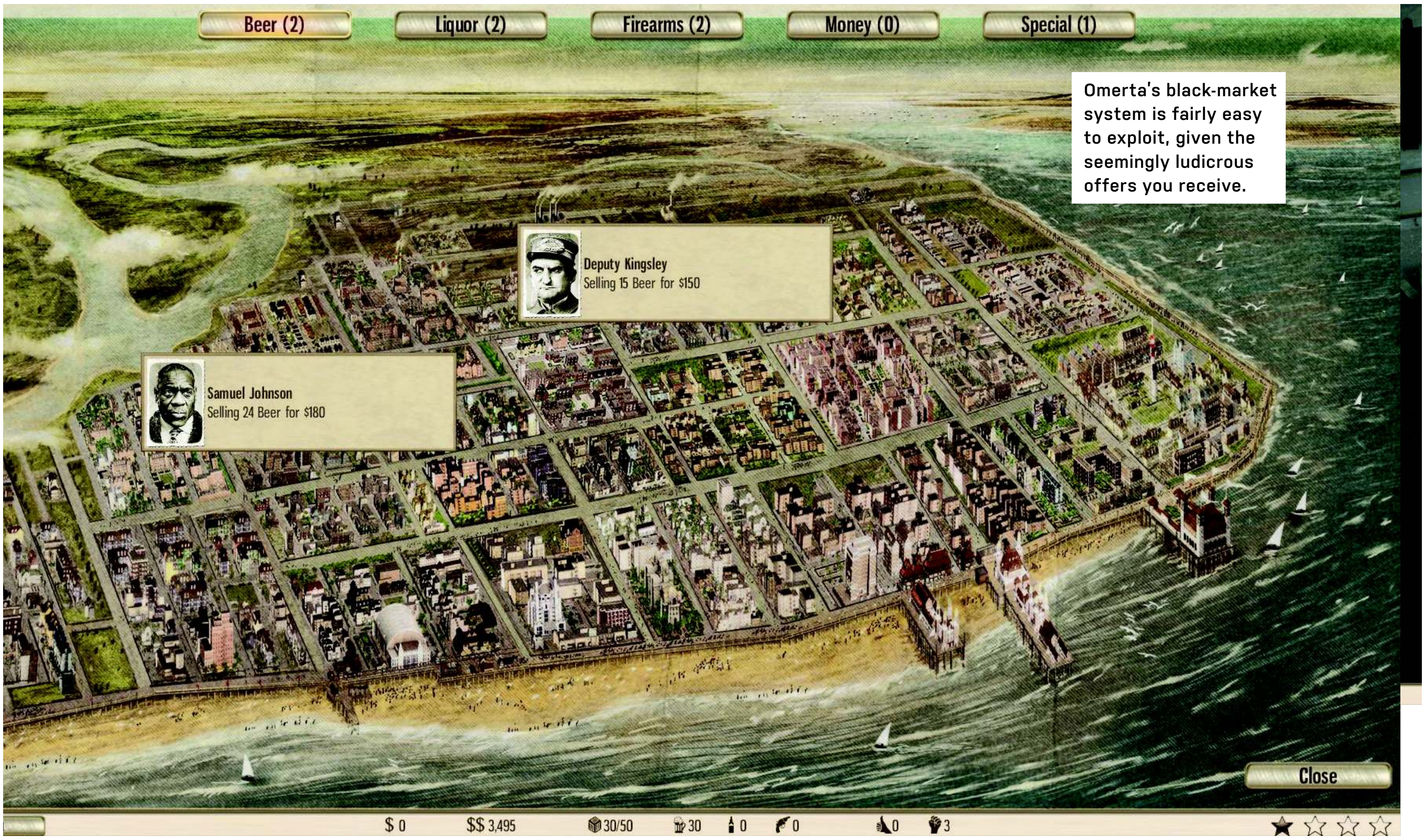
**VERDICT 7**

**HTC Windows Phone 8X**

**+ BLUE PHONE** f/2.0 camera; elegant WP8 OS; unibody design; superb contacts integration.

**– BLUE SCREEN** Can't remove battery; can't expand memory/storage; horrible calendar support; poor battery life; app store is lacking.

$100 with contract, www.htc.com




Omerta's black-market system is fairly easy to exploit, given the seemingly ludicrous offers you receive.

# Omerta: City of Gangsters

## Fails to execute as a simulation or strategic shooter

**WHEN WE SEE A** gangster game come out—especially one that blends our love of building a true, bootleggy, 1930s-style criminal empire with our zest for shooting thugs with poorly executed Italian accents—we get a little anxious. It's true. Give us a game that looks like a cross between Theme Park and Mafia and we'll be set for quite a long while, cackling with glee as we outrun the cops in old-timey cars while trying to deliver our bootlegged booze to our various speakeasies.

Omerta: City of Gangsters tries to recreate our lovely gangster fantasies and succeeds admirably to a small extent. However, it's a bit tough to call this game a "game" in the traditional sense, as its main storyline feels more like a giant sandbox that you can exploit to maximum advantage before actually doing anything that requires effort in this half-simulation, half-Fallout hybrid.

The gist of Omerta is simple. You, a fledgling crime lord, are tasked with running through various individual missions within the larger world of Atlantic City. The game follows all the standard archetypes of the genre: Each mission, you're given a set area to play within (which all look generally similar), and said area is filled with various buildings that you can rent, shoot up, bribe, or perform assorted other actions on depending on what the particular building actually is. You (rather quickly) unlock a ton of different buildings and actions that basically allow you to generate and spend resources.

For example, if you're big into beer, you can build yourself an (illegal) brewery or two. While your sim-gangster-wannabes get to bootleggin', you can take the booze they're storing up and either sell it to a speakeasy yourself, sell it on the game's version of an ever-present worldwide black market, or sit back and watch it automatically funnel on over to any speakeasies (or other beer-selling buildings) that you happen to own. Get rich, get paid; wash, rinse, repeat.

The game's buildings can get a bit more complicated. For example, you can throw down Boxing Arenas or Pawn Shops that automatically generate cash depending on the positivity (fame) or negativity (fear) your in-game actions generate. Running charity events and building soup kitchens is going to make your boxers shine, whereas being a jerk to all of your local businesses (and fellow Mafiosos) is going to make you the next Pawn Star/Don Corleone mashup.

While it's definitely fun to build your little mob city and level up your (creatively named) gangsters, one of the core issues surrounding Omerta is that it's just too easy, simulation-wise. You can literally take all the time in the world to craft a super-cash-generating, top-of-the-line criminal empire without having much to fear from, well, anything.




The game's characters do have some RPG elements, and period-appropriate names.




Zoom in and you'll actually be able to watch your mobsters carry out your assigned missions, including drive-bys.

The game's only real motivator is a little element it calls "heat," which is analogous to the star ratings you receive in your favorite Grand Theft Auto title whenever you perform naughty actions. Stir up too much negativity and the cops will come a-running, and you'll have to bribe them or use another clever trick (like giving up one of your own hirable henchmen) to avoid losing the game. But, again, given just how easy it is to construct a fairly lucrative criminal empire without interference, it's not that hard to get the cops off your trail—especially when you can frequently use the aforementioned, ever-present "black market" jobs board to reduce these heat levels before they become a problem.

Would we pay half of the game's asking price ($40) for the sim parts? Eh. They're certainly fun—a good way to spend a solid afternoon. But, devoid of real urgency, the simulation element of the game devolves as a real attention-getter faster than we expected it to at first.

As for the game's other half, the Fallout bits, we're referring to the turn-based tactical shooter that the game turns into whenever your business-friendly gangsters need to go, uh, take care of a little business (if you catch our drift). The comparisons to the recently released XCOM Enemy Unknown are easy to make, with a few caveats: The game can be a bit frustrating early on, until you start unlocking "Mobsters with Medkits," as we call them, because your small gang of fighters is going to go up against a decent number of other criminals without much of a reprieve.

On the plus side, you can't die in the game. Your knocked-out gangsters suffer quasi-permanent injuries when they get riddled full of holes, which will impair their ability to be awesome for a bit of time in the future. You'll likely suffer some injuries yourself, as the gamer, when you're pounding your fist against the desk at the AI's idiotic, charge-on-in strategy that seems to leave your gangsters hurtin' no matter how much cover you think you've stuck them behind.

While we do like the variety of abilities—and weapon modes—your gangsters bring to the table, it's safe to say that XCOM, this game ain't. The tactical battles aren't so much frustrating as they are uninteresting; we'd rather make our in-game cash and achieve our objectives by sitting back and letting our breweries churn than bothering with a more shoot-'em-up bank heist. Same reward, fewer annoyances (and less time spent).

It's puzzling that developer Haemimont Games didn't decide to add in AI for the game's high-level business strategy. Going toe-to-toe against an AI that's also renting buildings, setting up rackets, and doing other sorts of nefarious activity would have made this one a lot more interesting. Instead of bribing the police to keep yourself alive, you could have sent the cops against your hapless fellow mob bosses—sounds like fun to us!

Since the only thing keeping gamers interested in the criminal underworld of Atlantic City is the storyline—which reads more like an extended tutorial than *Goodfellas*—there's just not that much compelling about Omerta to keep fledgling gangsters addicted to their screens. Shoot, even the game's multiplayer is just its tactical shooter bit. Insert one Don Corleone–size yawn here. Omerta, like any upstart mob boss, arrived on the scene with so much potential, but this title feels like someone took a bat to its knees. **–DAVID MURPHY**

**VERDICT 5**

**Omerta: City of Gangsters**

**+ NICELY-NICELY JOHNSON** Great graphics; decently enjoyable simulation experience; trait-based RPG elements.

**– BIG JULIE** Ho-hum tactical shooting; not much of a challenge in general; boring multiplayer.

$40, www.cityofgangsters.com, ESRB: T

# LAB NOTES

JIMMY THANG **ONLINE MANIGING EDITOR**



# Scratching the Surface

## How Microsoft should have handled the RT's launch

**THERE ISN'T GOOD** news for Microsoft's Surface RT. Of the 1.25 million units shipped, only half were sold, according to analyst IHS iSuppli. Even worse, iSuppli says the return rate for the device has been high, too. That means it's time for some Monday-morning quarterbacking.

First, Microsoft could have handled the launch of the RT far better. For starters, it should have done a better job marketing and educating users about the device. Leading up to the release, I didn't see anything. I didn't even know the release date until a few days before—and I work in the industry. Second, Microsoft did a terrible job explaining that the RT isn't compatible with legacy apps (hello, returns). Third, Microsoft could have, at the very least, provided in-depth UI tutorials for the new interface. Finally, RT was too expensive. Android is able to compete with the iPad-dominated market because of its affordable pricing; Microsoft should have followed suit.





Josh Norem
**Senior Editor**

This month, two things I previously thought were impossible happened: I "upgraded" my work PC to Windows 8 Pro, and Nvidia spilled the beans on the GeForce Titan—a GPU that should offer almost double the performance of a single GTX 680. These two events aren't related, but they are a good reminder to never say "never."



Katherine Stevenson
**Editor-in-Chief**

The antivirus roundup we featured this month turned up some interesting results. Norton scoring a 10/Kick Ass will no doubt be seen as a stunning upset by all the haters. But, hey, the program's got chops. More noteworthy is the fact that all of the AV suites were so good. Next on my to-do list: switching from MSE to Avast.



Gordon Mah Ung
**Deputy Editor**

We're gearing up for a refresh-rate showdown between two panels, one a 60Hz and the other a 144Hz. My preference, from what I've seen, is for the higher refresh rate. It's insanely smooth, and once you use it, you wonder why you don't have one. To be fair, the challenge will be double-blind to remove any bias.



Tom McNamara
**Associate Editor**

If I seem familiar, that's probably because I interned at *Maximum PC* and *PC Gamer* a while back. But after several years as a samurai, hacker, and hi-fi stereo salesman, I am back in the fold. Ironically, my first post-hire tech purchase is a mobile phone—a quad-core model with 2GB of RAM. But that GeForce Titan is looking pretty OK too, I guess.

# LETTERS

WE TACKLE TOUGH READER QUESTIONS ON...

## > OCZ Objection
## > Bundled CDs
## > Ninite Limitation

### No Giveaways for Canadians

I've been a subscriber for about 10 years now. I love your magazine. But I am puzzled as to why all of your online contests are for US residents only? I am Canadian, and I always feel quite left out when a sweet contest or promo comes around. Just a thought on paper.

**—Jess Baryluk**

**EDITOR-IN-CHIEF KATHERINE STEVENSON RESPONDS:** Jess, we would love to open up our giveaways to Canadians, but the exclusion has been a long-standing policy of our company, Future US, Inc, for the simple reason that giveaways (which are essentially games of chance) could run afoul of Canada's strict gambling laws. We hope to do more skill-based contests for prizes in the future, which Canadians would be eligible for.

### OCZ, WTF?

I saw in the February 2013 issue a wonderful review of OCZ's brand-new Vector drive, and the Kick Ass award it received. I work for a big technology company, and I'm in a position where a lot of fellow hardware-minded people share a lot of information about what they're running at work and at home. I can say that with our partially scientific as well as non-scientific collective knowledge based on many installations, that nobody in their right mind would give OCZ's products such a wonderful rating.

While we certainly can corroborate the performance numbers, the reliability is extremely poor compared to the competition. Personally, the only time I have ever used one of its drives, the thing vanished off the SATA bus midway through an OS installation and then died; a rather poor first impression, but one that's stuck. Also, anyone who spends two minutes reading reviews on the big online retailer sites would probably come to a similar conclusion: OCZ drives are fast as hell when they work, which probably won't be for very long.

I know *Maximum PC* is all about performance, but when we trust these things with our data, I think it's a bit hard to swallow a Kick Ass rating for something that's got such a weak reliability record.

**—Mike Pepe**

**SENIOR SSD CORRESPONDENT JOSH NOREM RESPONDS:** It's a fair point, Mike, as OCZ has had reliability issues in the past, no doubt. To answer your question, we did not factor OCZ's past into our verdict, as it was based on the product in front of us and nothing more. When we do reviews, we are reviewing *that* product alone, and using data acquired in testing to help form our verdict. From time to time, we do factor subjective measurements like noise or "ease of use" into our verdicts, but we try to keep them as objective as possible so that readers understand how a verdict was reached. How a previous product performed will rarely be a factor in determining how a newer product is judged, especially in the case of OCZ's Vector, since it uses a totally new controller, and most of the "my SSD crapped the bed" issues are the result of controller problems. In a perfect world we would be able to run some kind of endurance tests on all SSDs, but in most cases it would take months of testing to come to any conclusions, which isn't compatible with magazine deadlines. So for now, we just test the drive as it is during testing, and the issue of whether to condemn a product based on the sins of the father is left up to you.

### Who Needs CDs?

I just read Jimmy Thang's review of the Corsair Hydro H80i (March 2013), which I have in my own rig. I agree with his review, except his one negative, which is bothering me enough to write in. It should include a software CD? What?! Honestly, when is the last time you used a software or driver CD, unless it's for a motherboard and Windows install didn't pick up the network drivers? In almost every case, the drivers and software are outdated by the time they arrive on a disc in your products box; it's always best practice to get the latest stable drivers and software for a device from the manufacturer's website, whether it comes with a disc or not. If my H80i had come with a disc, I would have chucked it right into the garbage, and hated that even a fraction of what I just spent might have been wasted printing useless software discs. It took me less time to download the drivers from the Corsair site than it would have to insert the

↘ submit your questions to: comments@maximumpc.com

disc. I could overlook this in *ComputerNoob Monthly*, but not in a mag I count on to always push the right way to do things. Come on, Jimmy, it's 2013!

**—Mike K**

**ONLINE MANAGING EDITOR JIMMY THANG RESPONDS:** While it's a good idea to download the latest drivers for whatever device you're installing, having a CD could be useful if you missed your Internet payment, if your router breaks, or if you've moved into a new place where Internet hasn't been set up. It was slightly cumbersome for us because we intentionally have no Internet access on our test rig (we don't want the integrity of our tests to be affected by any external factors). This meant we had to find a long Ethernet cable and drag it across the floor just to download a driver for a cooler. It's not a huge knock against the H80i, by any means, as it's still very Kick Ass, but having the driver on a CD also gives you the option of being lazy if you're not in the mood to navigate Corsair's labyrinth of a website. Considering NZXT had no problems including a CD with its Kraken X40 cooler that we reviewed this month, we don't see why Corsair couldn't do the same. Oh, and the awesome X40 manages to be $10 cheaper than the H80i... even with CD!

> I COULD OVERLOOK THIS IN *COMPUTERNOOB MONTHLY*, BUT NOT IN A MAG I COUNT ON TO ALWAYS PUSH THE RIGHT WAY TO DO THINGS

## Ninite Niggle

Upon your recommendation, I used Ninite when doing a clean Windows 8 install (How To, January 2013). One word of caution: I use an SSD (boot) drive and install most apps to my other drives. Ninite installs all the apps to the C drive.

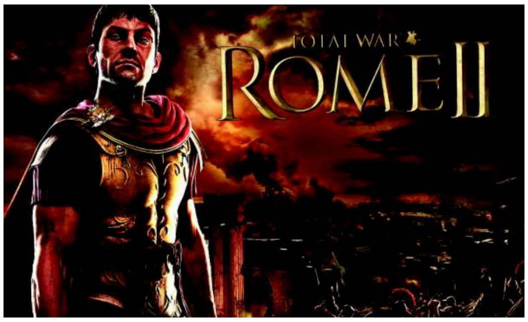
**—Jason Myers**

**SENIOR EDITOR JOSH NOREM RESPONDS:** Sadly, Ninite does not let the end user modify the install location of apps that are installed via its software, and this is done to simplify the process, according to the Ninite website. "We don't plan to support custom install locations," says the site, "because we believe where an app is installed is an implementation detail that users shouldn't worry about." The developers go on to address your problem specifically, Jason, writing, "The best argument we hear for this involves small solid-state disks for the OS partition. However, those will be getting larger quickly as the technology matures." They conclude by saying, "Also, users will likely want their frequently used apps on the fast SSD, too."

**[NOW ONLINE]**

## BEST 13 GAMES OF 2013

Remember when console gamers used to say, "PC gaming is dead"? Well, we've got 13 reasons why *they're dead... wrong*. Check out our online list of 13 high-profile games of 2013 that prove that the PC platform is not only surviving, but thriving. http://bit.ly/Ym5bIn



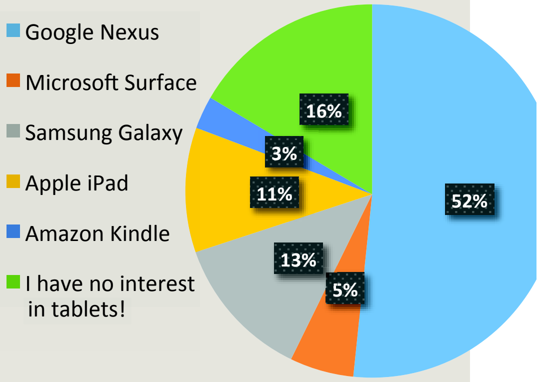

**Facebook Polls**

## What Was Your Biggest PC Building Mishap?

We asked for some of your worst machine-making misfires. Here's a selection for your education and reading pleasure.

**Bobby Mathis:** Never install a motherboard with an 18-volt cordless drill.
**Patrick Taylor:** I got thermal paste on both the CPU pins and the motherboard, and while cleaning the pins I bent two of them. It took me 16 hours to clean off everything—what a nightmare!
**Anthony Falcon:** I forgot to tighten down the clamps [on the hoses] of my first liquid-cooling system. Ended up with a $2,000 paperweight.
**Ryan Leach:** On my first PC build, I didn't understand the concept of motherboard standoffs. I fried the mobo, CPU, and HDD on the first boot.
**Ethan Ackerman:** I plugged a front-panel USB cable into a FireWire header on the motherboard, and fried a flash drive. It even melted the plastic casing off the drive.
**Heherson Dela Cruz:** I bought a $200 GPU and a generic PSU. Everything was fine until I went to play a game, and the PSU exploded.
**Kris Garcia:** I didn't test for holes in my liquid cooling system. There were holes ☹
**Brandon Meyer:** A customer brought RAM back, stating it didn't work. Inspected them and they were cut in half. The customer said they didn't fit so he sawed them in half.
**Butch Blancq:** Wait a minute while I get out my list...

## Which Tablet Do You Like the Best?




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# THE BUILDS



## BUDGET

### INGREDIENTS

| PART | | PRICE |
|---|---|---|
| Case/PSU | Rosewill R519-BK w/500W PSU | $70 |
| Mobo | Gigabyte GA-970A-UD3 ATX | $100 |
| CPU | AMD Phenom II X4 965 BE | $95 |
| Cooler | Stock AMD cooler | $0 |
| GPU | Asus Radeon HD 7770 1GB | $123 |
| RAM | 4GB (1x 4GB) Corsair Vengeance DDR3/1333 | $24 |
| Optical Drive | Lite-On iHOS124-04 DVD/CD writer **NEW** | $17 |
| SSD | Samsung 840 120GB **NEW** | $100 |
| Hard Drive | WD Caviar Blue 1TB **NEW** | $75 |
| OS | Windows 7 Home Premium 64-bit | $91 |

**Approximate Price: $695**

**THE BUDGET BOX** returns this month with a minor face-lift. We are sticking with AMD as a base platform instead of going Core i3 because an unlocked quad-core is still better than a Hyper-Threaded dual-core for multithreaded tasks, and you can overclock this CPU, whereas the Core i3 is locked down tighter than the Lambda Research Facility after the resonance cascade. We did switch the optical drive from an iHAS to an iHOS model, which sounds even sillier but is slightly cheaper. We also swapped the OCZ Vertex 3 SSD to a Samsung 840 model; we had a Vertex 3 fail in the Lab this month, making us a bit skittish about that model. Finally, we made a semi-lateral move on the hard-drive front, and replaced the perennial favorite Seagate Barracuda 1TB with the WD Caviar Blue 1TB model since they have similar specs but the Blue is $5 less expensive.



## BASELINE

### INGREDIENTS

| PART | | PRICE |
|---|---|---|
| Case | Corsair Carbide 200R | $35 |
| PSU | Corsair HX650 | $100 |
| Mobo | Asus P8Z77-V | $183 |
| CPU | Intel Core i5-3570K | $224 |
| Cooler | Cooler Master Hyper 212 Evo | $33 |
| GPU | EVGA GTX 660 **NEW** | $200 |
| RAM | 8GB Patriot Gamer DDR3/1600 | $39 |
| Optical Drive | Lite-On iHOS 104-06 **NEW** | $24 |
| SSD | 128GB OCZ Vertex 4 **NEW** | $122 |
| Hard Drive | 1TB Seagate Barracuda | $74 |
| OS | Windows 7 Home Premium 64-bit | $91 |

**Approximate Price: $1,125**

**WE'LL BE THE** first to admit there's not a lot of movement in the midrange-CPU and -motherboard games these days. The Intel Core i5-3570K's price-to-performance chops are simply unmatched by anything coming out of AMD's labs, and it will likely remain that way for some time to come. The same goes for the Asus P8Z77-V, which is such a well-rounded board that it's almost a sphere. We did swap the GPU this month, though, downgrading slightly from an Asus DirectCU II GTX 660 to an EVGA model, just because the EVGA is $35 less expensive, and we are confident that it's almost as quiet as the Asus model. On the SSD front, we took a long, hard look at our Samsung 840 model and decided to toss it in the bin in favor of the faster OCZ Vertex 4. We feel the vanilla 840 model is more suited to budget builds than it is to more performance-oriented machines, such as the Baseline.



# PERFORMANCE

**BAD NEWS, TWEEPS:** The Performance rig's price tag was inflated this month by $72, but such is the price of progress. We're still rocking the sharp-fanged Asus Sabertooth X79 motherboard and the Core i7-3820 CPU, but we dropped them both into the luscious NZXT Phantom 630 chassis simply because it offers a lot more square footage than the previous abode—the Thermaltake New Soprano—and it uses a 14cm rear exhaust fan. The second point is crucial, since it also let us upgrade our CPU cooler from the still-excellent Corsair H80i water cooler to the slightly quieter and ass-kickier NZXT Kraken X40. The Phantom 630 also gives us the option of installing a double radiator at some point in the near future, and we like having room for expansion.

Another key upgrade made this month was in the GPU department, where we finally have team AMD holding it down with the Radeon HD 7970 GHz Edition from XFX. We chose this card because it was less expensive than the GTX 670 while performing slightly better, and as of press time it came with two free games—Crysis 3 and BioShock Infinite, so the deal was too good to pass up. Lastly, we swapped the OCZ Vector 256GB SSD for the Samsung 840 Pro 256GB because they are very close in performance and the Sammy is $25 less expensive.

## INGREDIENTS

| PART | | | PRICE |
|---|---|---|---|
| Case | NZXT Phantom 630 | NEW | $180 |
| PSU | Corsair HX750 | | $120 |
| Mobo | Asus Sabertooth X79 | | $322 |
| CPU | Intel Core i7-3820 | | $290 |
| Cooler | NZXT Kraken X40 | NEW | $85 |
| GPU | XFX Radeon HD 7970 GHz | NEW | $400 |
| RAM | 16GB Corsair Vengeance DDR3/1600 | | $91 |
| Optical Drive | Asus BW-12B1ST | | $60 |
| SSD | Samsung 840 Pro 256GB | NEW | $226 |
| Hard Drive | 3TB Seagate Barracuda | | $138 |
| OS | Windows 7 Professional 64-bit | | $135 |

**Approximate Price: $2,047**

For more of our component recommendations, visit www.maximumpc.com/best-of-the-best.

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NZXT Kraken X40
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**MID-RANGE CPU**
Intel Core i5 3570K
$220, www.intel.com

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